Neousys Technology Inc.

Nuvo-2000 Series

Intel® Atom™ D525 Fanless Controller

User's Manual

Rev. A1

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Declaimer

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Declaration of Conformity

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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Chapter 1 Introduction

1.1 Overview

Nuvo-2000 accommodates three PCI/PCIe cards and two 2.5" hard drives in its shoe-box size. More than that, it provides versatile I/O interfaces such as COM ports, USB ports, Gigabit Ethernet port, parallel port and mini-PCIe port, not to mention that the isolated DIO channels can be integrated optionally into this compact box.

Leveraging Intel® Atom™ D525 1.8GHz dual-core processor, Nuvo-2000 delivers adequate computing performance for most Industrial applications, such as machine automation, tollgate control, automatic fare collection, factory plant monitoring and etc. We also give Nuvo-2000 ingenious design mechanically and electronically so it can have a reliable, fanless operation in the temperature range of -20 to 70°C.

Nuvo-2000 is designed for general-purpose usage. Its compact size, PCI/PCIe slots and simple yet useful I/O functions fit most applications where wall-mount IPC is currently deployed. And, what is more, the fanless design of Nuvo-2000 gives you much more reliability than an ordinary IPC in all kinds of environments.

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1.2 Product Specification

Specification of Nuvo-2030

System Core	
Processor	Intel® Atom™ D525 1.8GHz dual-core processor
Chipset	Intel® ICH8-M I/O Control Hub
Graphics	Integrated Intel® GMA 3150 graphics
Memory	1x 204-pin SO-DIMM socket, supports up to 4GB DDR3 800MHz SDRAM
Front-panel I/O Interface	
Ethernet	1x Intel® 82574L Gigabit Ethernet port
Video Port	1x DB-15 connector for analog RGB, supporting 2048 x 1536 resolution
Serial Port	1x software-programmable RS-232/422/485 (COM1) 1x RS-232 (COM2)
USB	4x USB 2.0 ports
KB/MS	1x 6-pin Mini-Din for PS/2 keyboard and mouse
Audio	1x Mic-in and 1x Speaker-out
Internal I/O Interface	
Serial Port	2x RS-232 (COM3 & COM4)
Parallel Port	1x Parallel port
Mini-PCIe	1x mini PCI Express connector with SIM socket
Isolated DIO	12-CH isolated DI + 12-CH isolated DO (Optional)
Storage Interface	
SATA HDD	2x Internal SATA ports for 2.5" HDD/SSD installation
CompactFlash	1x Type I & II CF socket
Expansion Bus	
PCI	3x PCI slots
PCI Express	N/A
Power Supply	
DC Input	Built-in 8~25 VDC DC input
Input Connector	1x 2-pin pluggable terminal block for DC input 1x DC jack (ø2.5) for AC/DC adapter input
Power Consumption	Typical: 14.6W (0.6A @ 24V) Full-loading: 26.4W (1.1A @ 24V) *
Mechanical	
Dimension	141 mm (W) x 156 mm (H) x 224 mm (D)
Weight	2.9 kg (with one 2.5" HDD and DDR3 memory module)

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Mounting	Wall-mount by mounting brackets
Environmental	
Operating Temperature	Standard model: -10°C ~ 55°C, 100% CPU loading **/*** Extended temperature model: -20°C ~ 70°C, 100% CPU loading **/***
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class B, according to EN 55022 & EN 55024

** Full-loading power consumption is measured with 2GB DDR3 memory and one 2.5" SATA HDD installed under the following conditions:*

- *100% loading for Atom D525 CPU*
- *100% loading for 3D graphics*
- *100% loading for GbE port*

*** The CPU loading is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neousys Technology*

**** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.*

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Specification of Nuvo-2021

System Core	
Processor	Intel® Atom™ D525 1.8GHz dual-core processor
Chipset	Intel® ICH8-M I/O Control Hub
Graphics	Integrated Intel® GMA 3150 graphics
Memory	1x 204-pin SO-DIMM socket, supports up to 4GB DDR3 800MHz SDRAM
Front-panel I/O Interface	
Ethernet	1x Intel® 82574L Gigabit Ethernet port
Video Port	1x DB-15 connector for analog RGB, supporting 2048 x 1536 resolution
Serial Port	1x software-programmable RS-232/422/485 (COM1) 1x RS-232 (COM2)
USB	4x USB 2.0 ports
KB/MS	1x 6-pin Mini-Din for PS/2 keyboard and mouse
Audio	1x Mic-in and 1x Speaker-out
Internal I/O Interface	
Serial Port	2x RS-232 (COM3 & COM4)
Parallel Port	1x Parallel port
Mini-PCIe	1x mini PCI Express connector with SIM socket
Isolated DIO	12-CH isolated DI + 12-CH isolated DO (Optional)
Storage Interface	
SATA HDD	2x Internal SATA ports for 2.5" HDD/SSD installation
CompactFlash	1x Type I & II CF socket
Expansion Bus	
PCI	2x PCI slots
PCI Express	1x PCI Express x4 slot
Power Supply	
DC Input	Built-in 8~25 VDC DC input
Input Connector	1x 2-pin pluggable terminal block for DC input 1x DC jack (ø2.5) for AC/DC adapter input
Power Consumption	Typical: 14.6W (0.6A @ 24V) Full-loading: 26.4W (1.1A @ 24V) *
Mechanical	
Dimension	141 mm (W) x 156 mm (H) x 224 mm (D)
Weight	2.9 kg (with one 2.5" HDD and DDR3 memory module)
Mounting	Wall-mount by mounting brackets
Environmental	
Operating Temperature	Standard model: -10˚C ~ 55˚C, 100% CPU loading **/***

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	Extended temperature model: -20°C ~ 70°C, 100% CPU loading **/***
Storage Temperature	-40°C ~85°C
Humidity	10%~90% , non-condensing
Vibration	Operating, 5 Grms, 5-500 Hz, 3 Axes (w/ SSD, according to IEC60068-2-64)
Shock	Operating, 50 Grms, Half-sine 11 ms Duration (w/ SSD, according to IEC60068-2-27)
EMC	CE/FCC Class B, according to EN 55022 & EN 55024

** Full-loading power consumption is measured with 2GB DDR3 memory and one 2.5" SATA HDD installed under the following conditions:*

- *100% loading for Atom D525 CPU*
- *100% loading for 3D graphics*
- *100% loading for GbE port*

*** The CPU loading is applied using Intel® Thermal Analysis Tool. For detail testing criteria, please contact Neousys Technology*

**** For sub-zero operating temperature, a wide temperature HDD drive or Solid State Disk (SSD) is required.*

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Specification of Optional Isolated DIO

Isolated Digital Input	
No. of Channel	12-CH Isolated Digital Input Channels
Logic Level	Logic High: 5 to 24V Logic Low: 0 to 1.5V
Isolated Voltage	2500 Vrms
Input Resistance	2.4kΩ
Isolated Digital Output	
No. of Channel	12-CH Isolated Digital Output Channels
Sink Current (per channel)	100 mA (sustained loading) 250 mA (peak loading)
Isolated Voltage	2500 Vrms
Output Type	Power MOSFET + Analog Device iCoupler®

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Chapter 2 Getting to know your Nuvo-2000

2.1 Unpacking your Nuvo-2000

When you receive the package of Nuvo-2000 series, please check immediately if the package contains all the items listed in the following table. If any item is missing or damaged, please contact your local dealer or Neousys Technology Inc. for further assistance.

Item	Description	Qty
1	Nuvo-2030 or Nuvo-2021 fanless controller (According to the configuration you order, the Nuvo-2030/2021 may contain HDD and DDR3 SODIMM. Please verify these items if necessary.)	1
2	Accessory box, which contains	
	● PS/2 Y-cable for KB/MS	1
	● HDD bracket for 1st HDD installation	1
	● SATA cable for 2nd HDD installation	1
	● Wall-mounting bracket	2
	● Neousys Drivers & Utilities DVD	1
	● Screw package	1
	● Hold-on spring plate	3
	● 2-pin pluggable terminal block	1

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2.2 Front Panel I/O Functions

On Nuvo-2000, we design all general-purpose I/O functions on the front panel so you can easily access them. In this section, we'll illustrate each I/O function on the front panel.

Power Button

The power button is a non-latched switch with LED for ATX mode on/off operation. To turn on the Nuvo-2000, press the power button and the blue LED is lighted up. To turn off the Nuvo-2000, you can either issue a shutdown command in OS, or just simply press the power button. In case of system halts, you can press and hold the power button for 5 seconds to compulsorily shut down the system. Please note that a 5 seconds interval is kept by the system between two on/off operations (i.e. once turning off the system, you shall wait for 5 seconds to initiate another power-on operation).

Reset Button

The reset button is used to manually reset the system in case of any abnormal condition. To avoid unexpected operation, the reset button is hidden behind the front panel. You need to use a pin-like object to push the reset button.

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LED Indicators

There are three LED indicators on the front panel: CF, HDD and WDT. The descriptions of these three LED are listed in the following table.

Indicator	Color	Description
CF	Green	CF indictor, flashing when CompactFlash card is active.
HDD	Red	Hard drive indicator, flashing when SATA hard drive is active.
WDT	Yellow	Watchdog timer indicator, flashing when watchdog timer is started.

USB Connectors

There are totally four USB ports on the front panel. By BIOS default, these USB ports are operated in EHCI (Enhanced Host Control Interface) mode and are compatible to USB 2.0, USB 1.1 and USB 1.0 devices. Legacy USB support is also provided so you can use USB keyboard/mouse in DOS environment.

PS/2 Keyboard and Mouse Connectors

Support of legacy PS/2 keyboard and mouse on Nuvo-2000 is implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C). There is one 6-pin Mini-DIN connector on the front panel to provide PS/2 KB/MS signals. To connect PS/2 keyboard and

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mouse at the same time, you need to use the Y-cable. You can find the PS/2 Y-cable in the accessory box shipped with Nuvo-2000.

Gigabit Ethernet Port

Nuvo-2000 offers one Gigabit Ethernet port using Intel® 82574L GbE controller. When plugging in the Ethernet cable, you can tell the Ethernet status and speed from the LED indicators on the RJ45 connector as following:

Active/Link LED

LED Color	Status	Description
Yellow	Off	Ethernet port is disconnected
	On	Ethernet port is connected and no data transmission
	Flashing	Ethernet port is connected and data is transmitting/receiving

Speed LED

LED Color	Status	Description
Green or Orange	Off	10 Mbps
	Green	100 Mbps
	Orange	1000 Mbps

To utilize the GbE port in Windows, you need to install corresponding driver for Intel® 82574L GbE controller. Please refer to section 4.3 for information of driver installation.

Audio Jacks

Nuvo-2000 provides audio function using Intel® High Definition Audio (built-in in ICH8-M) and Realtek ALC262 codec. There are two audio jacks on the front panel. The pink one is used for microphone input, and the green one is used for speaker output. To utilize the audio function in Windows, you need to install corresponding drivers for both Intel® ICH8-M chipset and Realtek ALC262 codec. Please refer to section 4.3 for information of driver installation.

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VGA Connector

VGA connector is the most popular way to connect a display. The VGA output of Nuvo-2000 supports up to 2048 x 1536 resolution. By BIOS default and hardware implementation, the VGA output is always enabled in any case. To achieve best VGA output resolution in Windows, you need to install corresponding graphics driver. Please refer to section 4.3 for information of driver installation.

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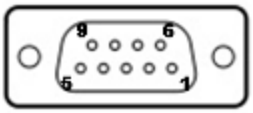
COM Ports (COM1 & COM2)

Nuvo-2000 provides four COM ports for communicating with external devices. COM1 and COM2 are located on the front panel via 9-pin D-Sub male connectors. And COM3 and COM4 are located on SBC via 10-pin box headers. These COM ports are implemented using industrial-grade ITE8783 Super IO chip (-40 to 85°C) and provide up to 115200 bps baud rate.

COM1 is a software-selectable RS-232/422/485 port and COM2 supports RS-232 only. The operation mode of COM1 can be set in BIOS setup utility (refer to section 4.1 for detail). The following table describes the pin definition of COM ports.



	COM1			COM2/COM3/COM4
Pin#	**RS-232 Mode**	**RS-422 Mode**	**RS-485 Mode (Two-wire 485)**	**RS-232 Mode**
1	DCD	422 RXD-		DCD
2	RX	422 RXD+		RX
3	TX	422 TXD+	485 TXD+/RXD+	TX
4	DTR			DTR
5	GND			GND
6	DSR			DSR
7	RTS	422 TXD-	485 TXD-/RXD-	RTS
8	CTS			CTS
9	GND			RI

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DC Jack

Nuvo-2000 offers two ways for DC power input. You can supply DC power via either the DC jack or the pluggable terminal block on the front panel.
The DC jack is designed to use with a 12V AC/DC adapter with a ø2.5/5.5 plug. It's convenient for indoor usage where AC power is usually available.

Caution

1. *The rated voltage of DC jack is 16V. Supplying a voltage over 16V may cause safety issue.*
2. *You should use either 2-pin pluggable terminal block or DC jack for DC power input. DO NOT supply power to both connectors at the same time.*

DC Input Terminal Block

Nuvo-2000 offers two ways for DC power input. You can supply DC power via either the DC jack or the pluggable terminal block on the front panel.
The 2-pin pluggable terminal block is fit for field usage where DC power is usually provided. It accepts a wide range of DC power input from 8 to 25V. And the screw clamping connection of terminal block gives a very reliable way of wiring the DC power. The following table describes the pin definition of the pluggable terminal block. For detail information of connecting DC power, please refer to section 3.7.

Pin	Description
V+	Positive polarity of DC power input.
V-	Negative polarity of DC power input (usually power ground).

Caution

1. *Please make sure the voltage of DC power is correct before you connect it to Nuvo-2000. Supplying a voltage over 25V will damage the system.*
2. *You should use either 2-pin pluggable terminal block or DC jack for DC power input. DO NOT supply power to both connectors at the same time.*

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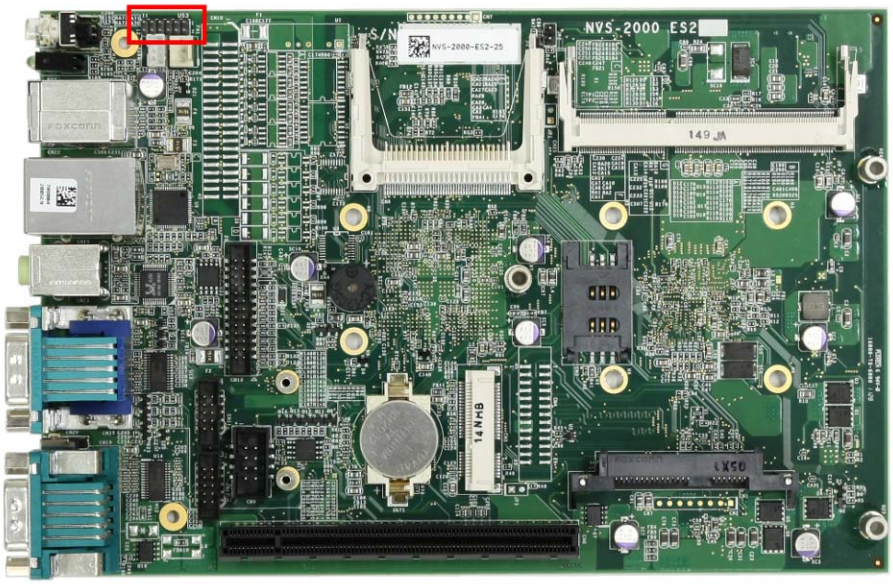
2.3 Internal I/O Functions

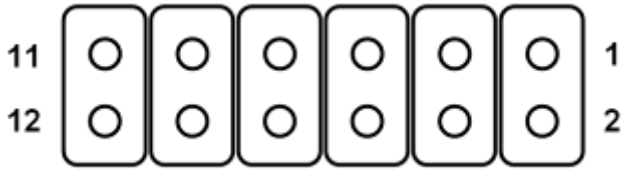
In addition to I/O connectors on the front panel, Nuvo-2000 provides more useful features via its on-board connectors, such as remote on/off control, LED status output, parallel port and etc. In this section, we'll illustrate these internal I/O functions.

Status LED Output & Reset Control



For an application which places Nuvo-2000 inside a cabinet, it's useful to output the system status to external LED indicators so that users can check how the system's running. Nuvo-2000 provides a 2x6, 2.0mm pitch pin header to output system status such as power, HDD, CF, LAN, watchdog timer, and control system reset.

The status LED output has a built-in series-resistor and provides 10mA current to directly drive the external LED indicators. System reset control is also provided so you can use an external non-latched switch to reset the system. The following table describes the pin definition of the status LED output.



Pin#	Definition	Description
1	Power+	System power indicator, on if system is turned on, off if system is turned off.
2	Power-	
3	HDD+	Hard drive indicator, flashing when SATA hard drive is active.
4	HDD-	

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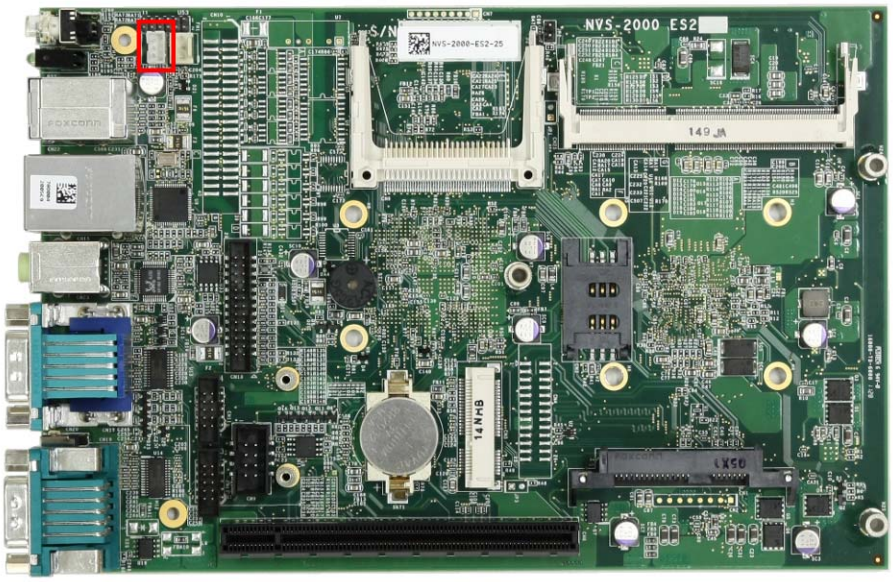
5	CF+	CF indictor, flashing when CompactFlash card is active.
6	CF-	
7	LAN+	LAN indicator, flashing when Ethernet port is connected and data is transmitting/receiving
8	LAN-	
9	WDT+	Watchdog timer indicator, flashing when watchdog timer is started.
10	WDT-	
11	Reset+	System reset control. You can connect these two pins to a non-latch switch to reset the system.
12	Reset-	

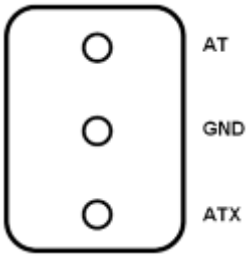
Note

Please make sure the polarity is correct when you connect the external LED indicator to the Status LED Output.

Remote On/Off Control



The remote on/off control function allows users to turn on or turn off the system remotely by connecting an external switch. The function is provided via a 3-pin, 2.0mm pitch wafer connector. Both AT-mode and ATX-mode on/off control are supported. For detail information of using remote on/off control function, please refer to section 3.8.



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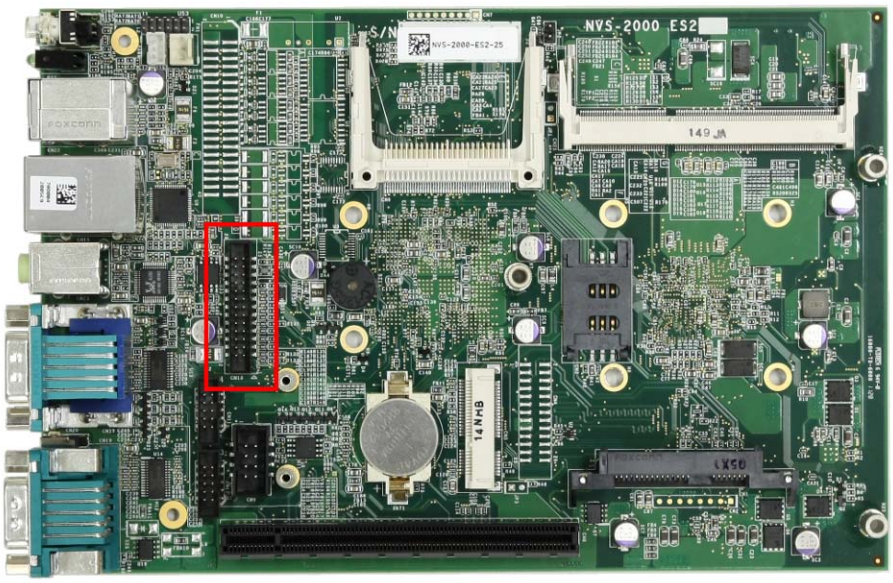
Parallel Port



Nuvo-2000 provides one parallel port for connecting a printing device. The parallel port is implemented using industrial-grade ITE8783 Super IO chip (-40 to 85˚C) and has pin-out via a 2x13, 2.00mm pitch box header. For users who need to connect a printing device via a standard DSub-25 connector, Neousys Technology Inc. provides an optional panel/cable kit to expose one DSub-25 (parallel) and one DSub-9 (COM port).

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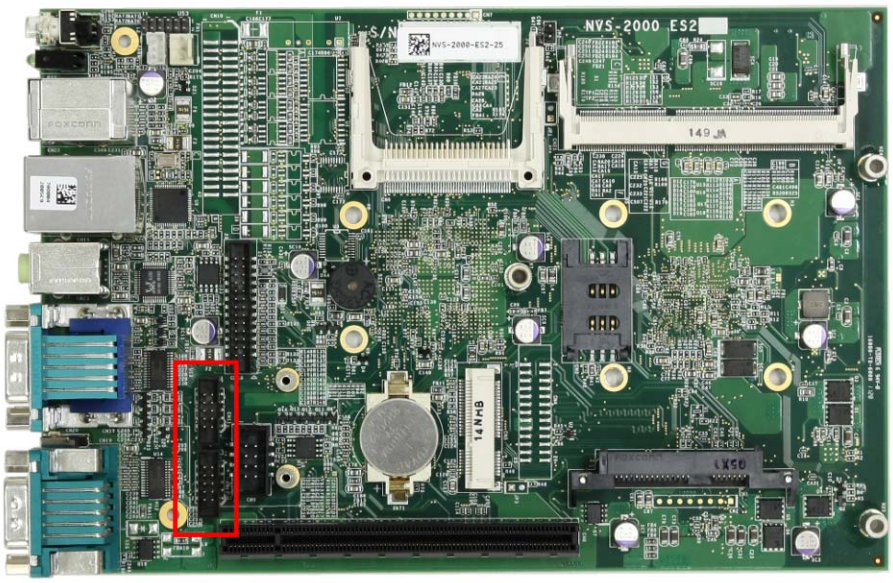
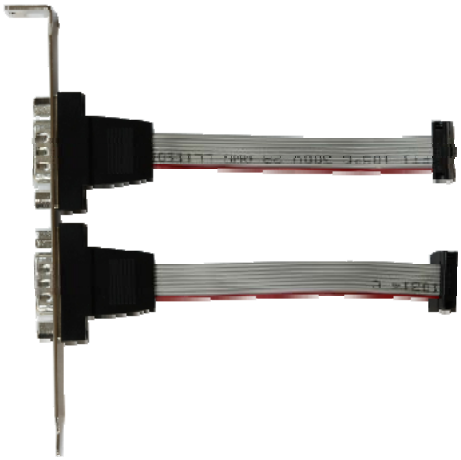
COM Ports (COM3 & COM4)



Nuvo-2000 provides four COM ports for communicating with external devices. COM1 and COM2 are located on the front panel via 9-pin D-Sub male connectors. COM3 and COM4 are located on SBC via 10-pin box header. These COM ports are implemented using industrial-grade ITE8783 Super IO chip (-40 to 85˚C) and support up to 115200 bps baud rate.

COM3 and COM4 support 9-wire RS-232 operation. For users who need to connect devices via standard DSub-9 connectors, Neousys Technology Inc. provides an optional panel/cable kit to expose two DSub-9 connectors.



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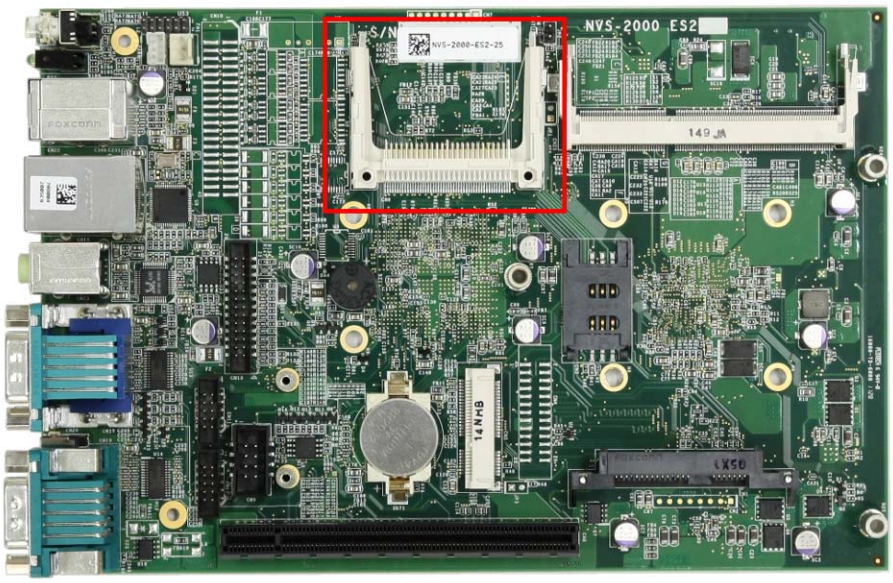
CF Socket



Nuvo-2000 provides an on-board CF socket which accepts Type I & II CompactFlash card. It is implemented by directly connecting to the IDE port of ICH8-M chipset. The system recognizes the CF card installed as an IDE storage device. Accordingly you can install any operating system in the CF card, such as Windows XP, Windows XP Embedded, Windows 7, Linux and etc.

Note

When using a CF card as storage device, we highly recommend you to set the IDE Controller Mode as "IDE+SATA (Non-AHCI)" in BIOS setup for better compatibility.

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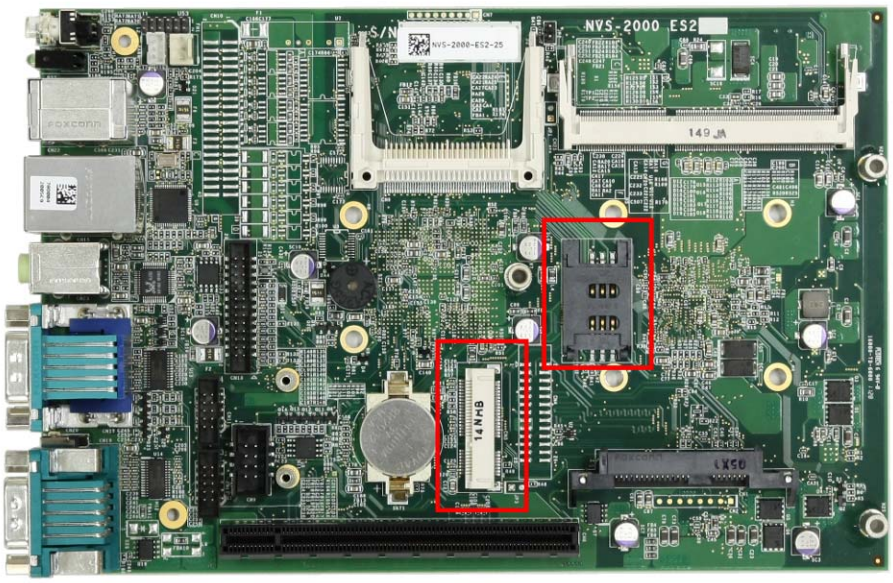
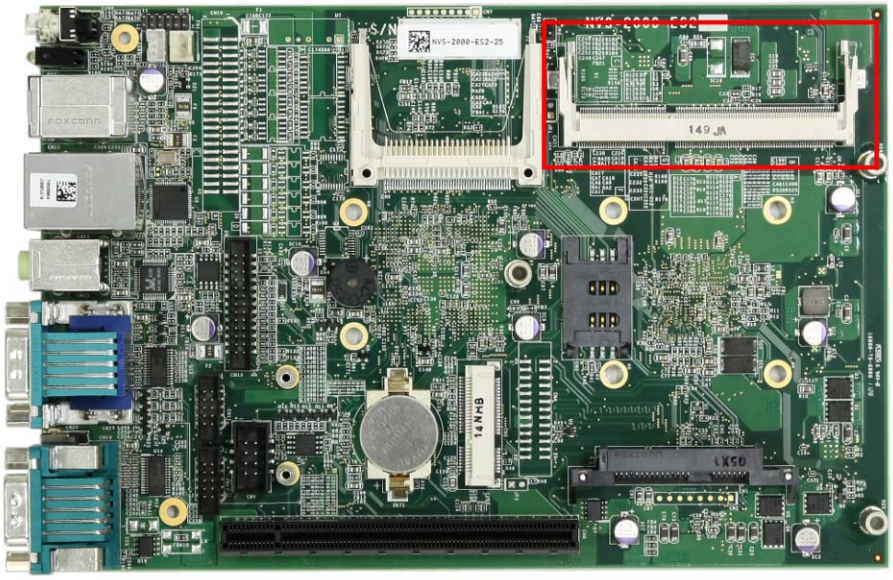
Mini PCI Express Connector and SIM Socket



Nuvo-2000 provides an on-board Mini PCI Express socket with SIM card support. There are plenty of off-the-shelf mini-PCIe modules with versatile capabilities. By installing a mini-PCIe module, your system can have expanded features such as WIFI, 3G, GPS, RAID and etc. In addition, the SIM card support makes it possible to connect your system to Internet in wide territory through telecom operator's GPRS/3G network.

DDR3 SODIMM Socket



Nuvo-2000 provides a 204-pin, SODIMM socket for installing a DDR3 memory module. It supports a maximal 4GB, 800MHz DDR3 SODIMM module. You can also install a DDR3 1066MHz or 1333MHz SODIMM module, the system will automatically adjust the memory

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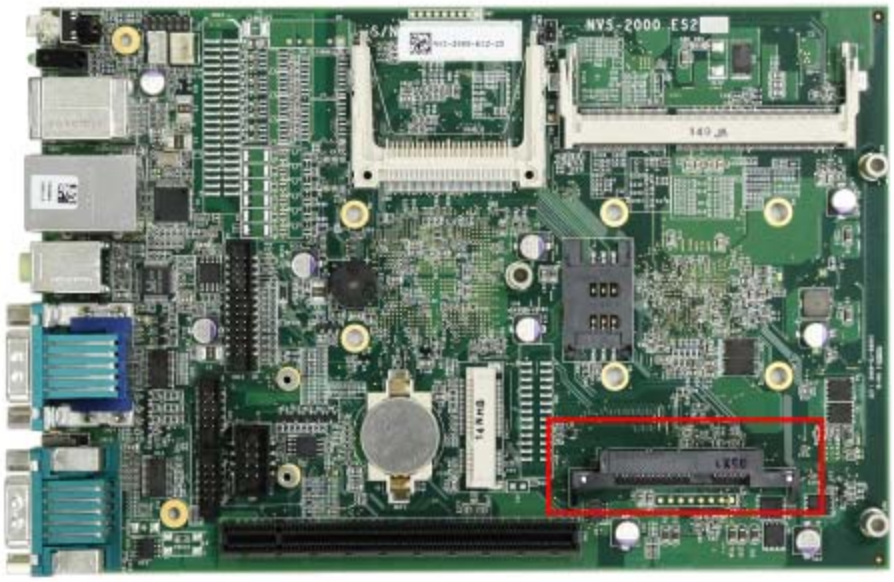
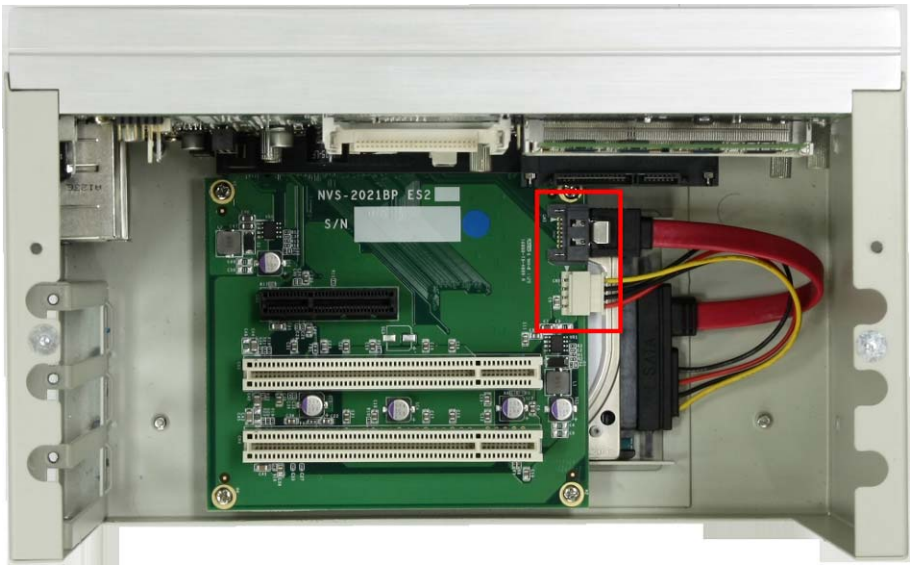
frequency to 800MHz. For information of installing a DDR3 memory module, please refer to section 3.4 for detail.

SATA#1 Connector



Nuvo-2000 provides two SATA ports to accommodate two 2.5" SATA hard drives in its chassis. The first SATA port is located on the SBC via a 22-pin SATA connector. With the HDD bracket shipped with Nuvo-2000, you can directly mount a 2.5" HDD or SSD to this port. For information of installing a HDD/SSD to SATA#1 port, please refer to section 3.1 for detail.

SATA#2 Connector



Nuvo-2000 provides two SATA ports to accommodate two 2.5" SATA hard drives in its chassis. The second SATA port is located on the backplane via a 7-pin SATA connector plus

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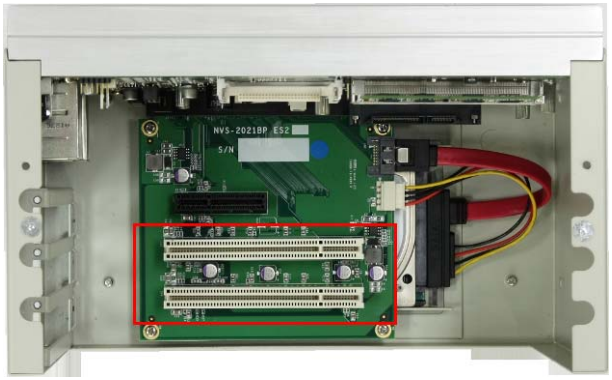
a 4-pin power connector. A dedicated cable is shipped with Nuvo-2000 for connecting the second 2.5" HDD/SSD. The second HDD bracket is located on the bottom side of the chassis. For information of installing a HDD/SSD to SATA#2 port, please refer to section 3.2 for detail.

PCI Slot



PCI slots are located on the backplane of Nuvo-2000. Nuvo-2030 provides three PCI slots and Nuvo-2021 provides two PCI slots. These PCI slots support 5V PCI bus and can accommodate the PCI card with a maximal dimension of 205mm x 105mm (PCB size, excluding connector). Nuvo-2000 also provides an ingenious design of hold-on bar to hold and fix your PCI add-on card for better reliability. For information of installing PCI cards, please refer to section 3.5 for detail.

Note

1. *Due to the fanless feature, the total power consumption of installed PCI and PCIe cards should be confined to **12W** to limit the heat generated by add-on cards and maintain the system stability. For applications need add-on cards which consume more than 12W, the fan option is suggested to maintain a reasonable temperature inside the chassis. Please contact Neousys Technology for the fan option.*
2. *The operating temperature of the whole system when cards installed is affected by the power consumption and operating temperature of add-on cards. Please consult your add-on card dealer or Neousys Technology for further information.*

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x4 PCI Express Slot

Nuvo-2021 provides one x4 PCI Express slot. This PCI Express slot utilizes x4 PCIe link and delivers 1 GB/s bandwidth. It can accommodate a PCIe card with a maximal dimension of 205mm x 105mm (PCB size, excluding connector). Nuvo-2000 also provides an ingenious design of hold-on bar to hold and fix your PCIe add-on card for better reliability. For information of installing PCIe cards, please refer to section 3.5 for detail.

Note

1. *Due to the fanless feature, the total power consumption of installed PCI and PCIe cards should be confined to **12W** to limit the heat generated by add-on cards and maintain the system stability. For applications need add-on cards which consume more than 12W, the fan option is suggested to maintain a reasonable temperature inside the chassis. Please contact Neousys Technology for the fan option.*
2. *The operating temperature of the whole system when cards installed is affected by the power consumption and operating temperature of add-on cards. Please consult your add-on card dealer or Neousys Technology for further information.*

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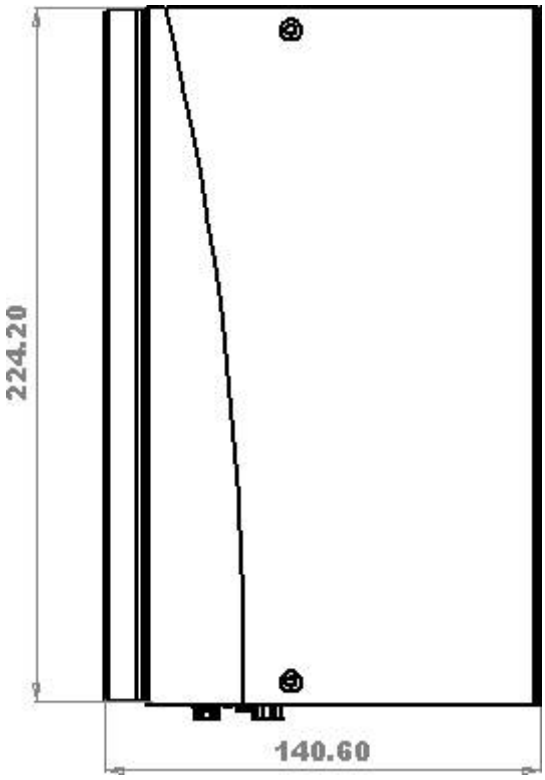
2.4 Mechanical Dimension

Top View



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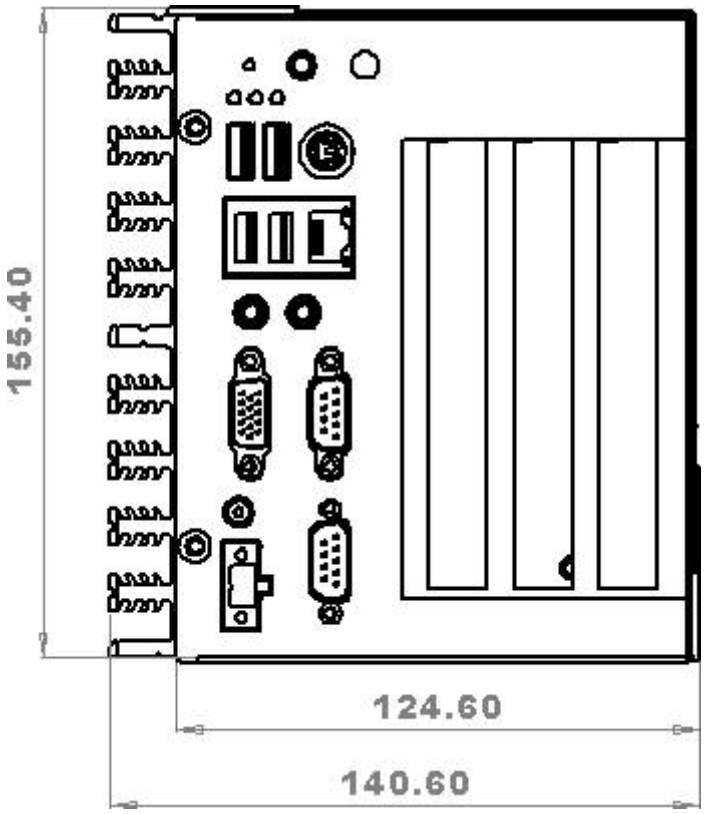
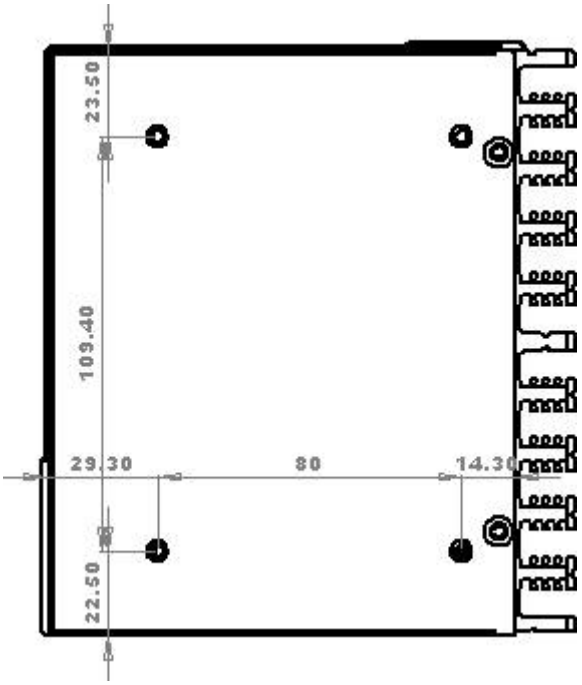
Front View



Back View



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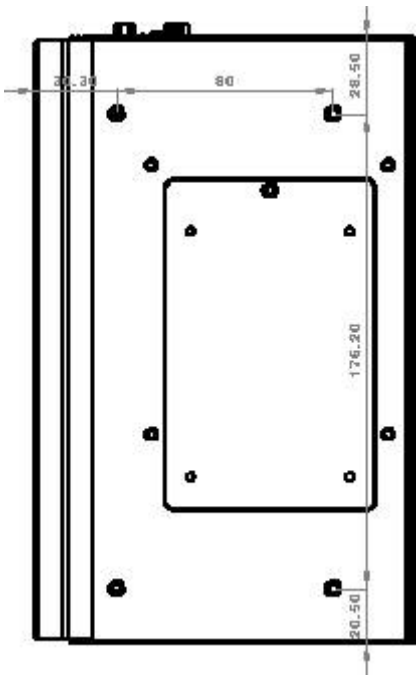
Bottom View



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Chapter 3 Getting Start

3.1 Install a HDD on SATA#1 Port

The SATA#1 port is located on the SBC via a 22-pin SATA connector. A dedicated bracket is shipped with Nuvo-2000 for mounting your HDD to this SATA port. To install a HDD on SATA#1 port, please follow the steps listed below.

1. Loose 4 screws outside the chassis.

2. Lie down the chassis and open the chassis by sliding the cover off the box.

3. Get the HDD bracket and four M3 P-head screws from the accessory box. And install your HDD into the HDD bracket. Note that the HDD must be placed in a right direction.

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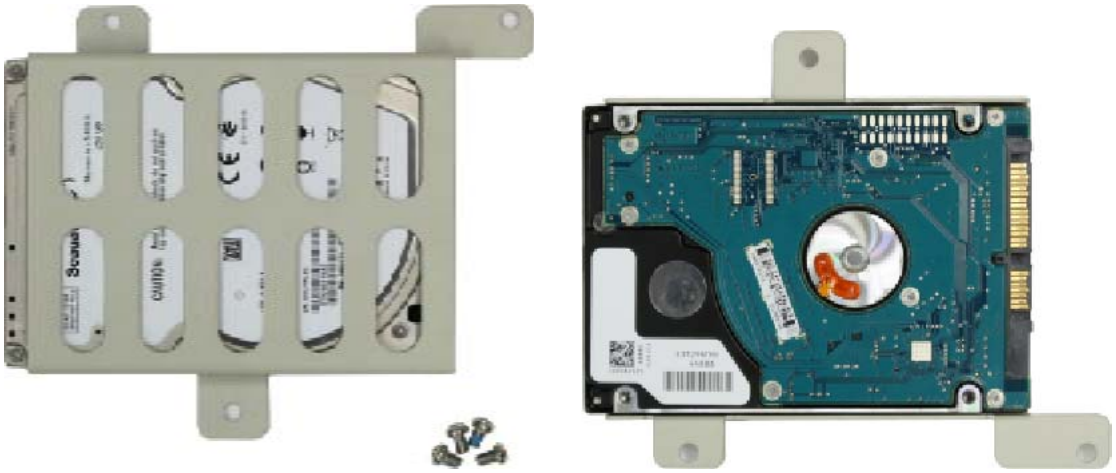

4. Fasten the HDD using four M3 P-head screws.

(Another two screws are on the opposite side)

5. Get three M3, L16 P-head screws from the accessory box. Gently slide the HDD bracket assembly into the SATA#1 connector on the SBC. Three holes of HDD bracket shall be aligned with three posts on the SBC.

6. Fasten the HDD bracket assembly with three M3, L16 P-head screws. Now you've done the installation of HDD for SATA#1 port.

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3.2 Install a HDD on SATA#2 Port

The SATA#2 port is located on the backplane via a 7-pin SATA connector plus a 4-pin power connector. HDD bracket for SATA#2 port is part of the chassis and is on the bottom side. A dedicated cable is shipped with Nuvo-2000 for connecting the 2.5" HDD. To install a HDD on SATA#2 port, please follow the steps listed below.

1. Put the chassis upside down. You can see the cover of HDD bracket exposed. Loose the screw to open and remove it.

2. Get four M3 flat-head screws from the accessory box. And place your HDD into the HDD bracket. Note that the HDD must be placed in a right direction.

3. Fasten the HDD using four M3 flat-head screws.

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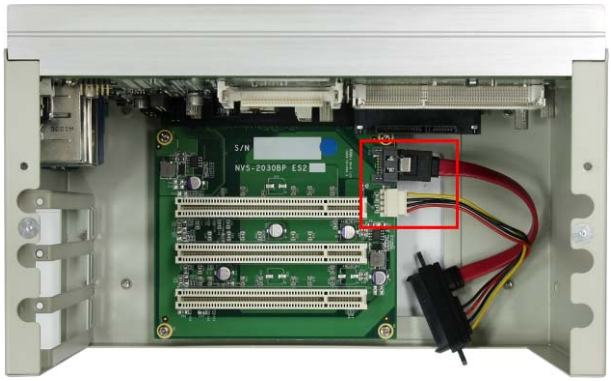
(Another two screws are on the opposite side)

4. Get the SATA cable from the accessory box. And connect it to SATA#2 port (7-pin SATA signals and 4-pin power) on the backplane. Note that the polarity of power connector must be connected correctly.



5. Connect the HDD assembly to the 22-pin connector of the SATA cable.

6. Tilt the HDD assembly and insert the wedge of HDD bracket to the bottom cover. Once it's firmly wedged, push it down and fix it using a M3 flat-head screw. Now you've done the installation of HDD for SATA#2 port.

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3.3 Install a CF card

Nuvo-2000 provides an on-board CF socket which accepts Type I & II CompactFlash card. The CF socket is directly connected to IDE port of ICH8-M chipset and accordingly you can use a CF card for installing operating system such as Windows XP, Windows 7, Linux and etc. To install a CF card, please follow the steps listed below.

1. Open the chassis by following step #1 and #2 in section 3.1. A CF socket is exposed.
2. Align your CF card with the guide of the CF socket. Note that you must have the obverse side toward the SBC.

3. Push down your CF card until it's firmly contacted with pins of the CF socket.

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3.4 Install the DDR3 SODIMM Module

Nuvo-2000 provides a 204-pin, SODIMM socket for installing a DDR3 memory module. It supports a maximal 4GB, 800MHz DDR3 SODIMM module. To install the DDR3 SODIMM module, please follow the steps listed below.

1. Open the chassis by following step #1 and #2 in section 3.1. A DDR3 SODIMM socket is exposed.
2. Tile the SODIMM module and insert it to the SODIMM socket on the SBC.

3. As the DDR3 SODIMM module is firmly contacted with socket connectors, press it down until the clamps of the socket snap into the latching position of SODIMM module.

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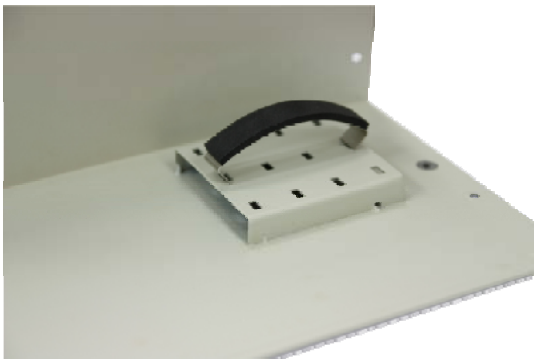
3.5 Install the PCI/PCIe Add-on Cards

Nuvo-2000 provides PCI and PCIe slots on its backplane. Nuvo-2030 provides three PCI slots and Nuvo-2021 provides two PCI slots plus one x4 PCIe slot. Nuvo-2000 supports 5V PCI bus and can accommodate PCI/PCIe cards with a maximal dimension of 205mm x 105mm (PCB size, excluding connector).
To hold your PCI/PCIe add-on card firmly for more robust operation, a spring-plate of special shape is provided to apply an adequate push-down force to the card. The hold-on spring-plate is adjustable and fits the add-on cards with height between 90mm ~ 100mm (excluding the "golden finger" of the PCI/PCIe card). To install the PCI/PCIe add-on card, please follow the steps listed below.

1. Open the chassis by following step #1 and #2 in section 3.1. The PCI/PCIe slots are exposed.
2. Get the hold-on spring-plate from the accessory box.

3. Insert the hold-on spring-plate into the base inside the chassis cover. There are four joint grooves on the base. You can adjust the position and height of hold-on spring-plate to fit your add-on card better.



4. Install your add-on card into the PCI slot. Make sure the "golden finger" connector is firmly contacted with PCI slot connector and the faceplate of the add-on card is well inserted to the groove underneath.

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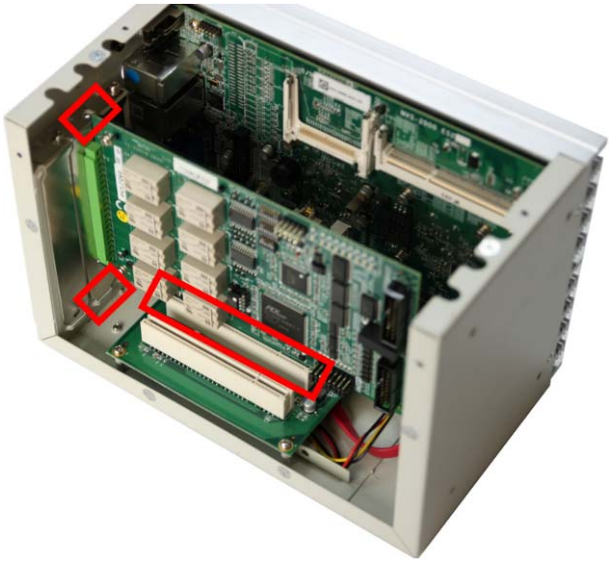

5. Get the M3 PW-head screw from the accessory box. And use it to fix your PCI/PCIe add-on card.

6. Put the chassis cover back and fix it with M3 F-head screws.

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3.6 Mount your Nuvo-2000

Nuvo-2000 is shipped with wall-mount brackets. You can mount your Nuvo-2000 in an upright or transverse way by fix the wall-mount brackets on back side or bottom side of the chassis. It provides a more flexible way of deployment when you need to put your Nuvo-2000 in a limited space. To mount your Nuvo-2000, please follow the steps listed below.

1. Since Nuvo-2000 is shipped with foot pads installed, you have to remove the foot pads first to get the M4 screws for fixing wall-mount brackets.

2. Get two wall-mount brackets from the accessory box.

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3. There are two sets of holes, which are located on the back side and bottom side respectively, to fix the wall-mount brackets. You can either mount your Nuvo-2000 in this way.

4. Or, in this way.

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3.7 Connect DC power to you Nuvo-2000

There are two connectors on the front panel you can use for DC power input: a 2-pin pluggable terminal block and a DC jack. The 2-pin pluggable terminal block accepts 8~25V DC input and the DC jack accepts 12V DC input.

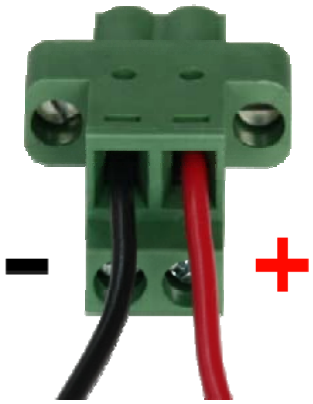
Caution

1. *Please make sure the voltage of DC power is correct before you connect it to Nuvo-2000. Supplying a voltage over 25V will damage the system.*
2. *You should use either 2-pin pluggable terminal block or DC jack for DC power input. DO NOT supply power to both connectors at the same time.*

Connect DC power via the 2-pin pluggable terminal block

The 2-pin pluggable terminal block provides a reliable way for DC power input since the power wires and terminal block itself can be fasten by screws. To connect DC power via the 2-pin pluggable terminal block, please follow the steps listed below.

1. Make sure the external DC power supply is power off or disconnected before wiring.
2. Get the 2-pin pluggable terminal block from the accessory box. The terminal block fits the wires with a gauge of 12~24 AWG.
3. Carefully identify the positive and negative contacts of your DC power supply and pluggable terminal block. The polarities between DC power supply and terminal block must be positive (+) to positive (+) and negative (-) to negative (-).



4. Insert the wires to correct contacts of pluggable terminal block and tighten clamping screws using a Philips screwdriver.
5. Firmly plug the terminal block into a receptacle on the front panel, and tighten the captive screws using a Slotted screwdriver.

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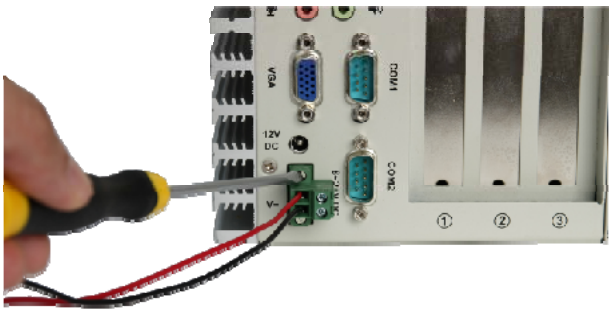
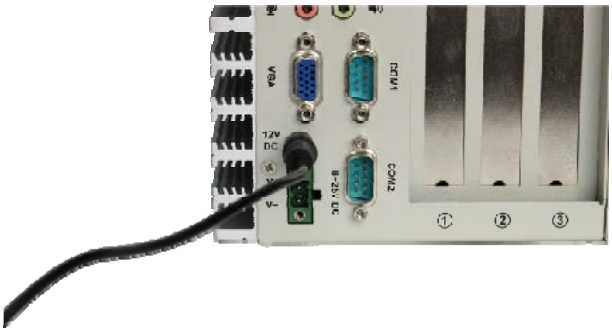


Connect DC power via the DC jack

The DC jack provides a convenient way for DC power input especially in an indoor environment. You can use an off-the-shelf 12V AC/DC adapter for the DC jack. To connect DC power via the DC jack, please follow the steps listed below.

1. Find your AC-DC adapter with a matched DC plug. The DC jack only accepts a DC plug with ø2.5mm/5.5mm (inner diameter of 2.5mm and outer diameter 5.5mm).
2. Make sure the AC-DC adapter is off before you connect the DC plug to your Nuvo-2000.
3. Plug the AC-DC adapter into the DC jack and push it to the end. The DC plug shall stay firmly with the DC jack.



3.8 Power on your Nuvo-2000

For better flexibility of operation, Nuvo-2000 provides four alternatives to power on your Nuvo-2000. You can turn on your Nuvo-2000 by pressing the power button, using an external latched or non-latched on/off switch, or by sending a special LAN packet. In this section, we illustrate these four ways to power on your Nuvo-2000.

To power on Nuvo-2000 using the power button on the front panel

This is the simplest way to turn on your Nuvo-2000. The power button on the front panel is

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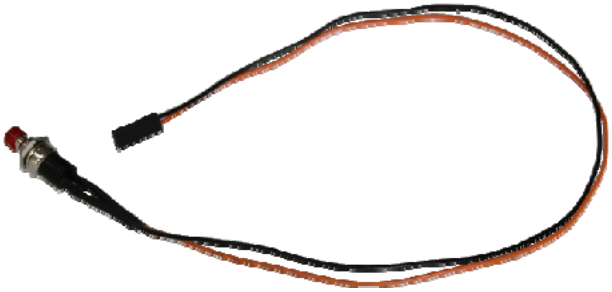
a non-latched switch and behaves an ATX-mode on/off control. As DC power is connected, push the power button and then system is on as well as the blue LED of power button is on. Push the button when system is on can turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), push the power button causes a pre-defined system behavior, such as shutdown or hibernation.

To power on Nuvo-2000 using an external latched switch (AT-mode)

For an application which places Nuvo-2000 inside a cabinet, it's useful to control the on/off of the system using an external switch. Nuvo-2000 provides an on-board 3-pin wafer connector (for detail, please refer to section 2.3) for connecting a latched/non-latched switch and behaves either AT-mode or ATX-mode power on/off control.
When using the AT-mode on/off control, you need a latched switch. The external latched switch controls the feed-in of DC power. When the switch is closed, the DC power is break-off. When it's opened, the DC power is feed-in. To power on Nuvo-2000 using an external latched switch (AT-mode), please follow the steps listed below.

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** BIOS setting menu.
3. Configure the **[Power On after Power Failure]** BIOS option as **[ON]**. This setting allows the system to turn on after external DC power is feed-in. Please refer to section 4.1 for the instruction of configuring this option.
4. Prepare a latched switch with a 2-pin, 2.0mm pitch connector.



5. Connect the latched switch to the AT pin and GND pin of the on-board wafer connector.

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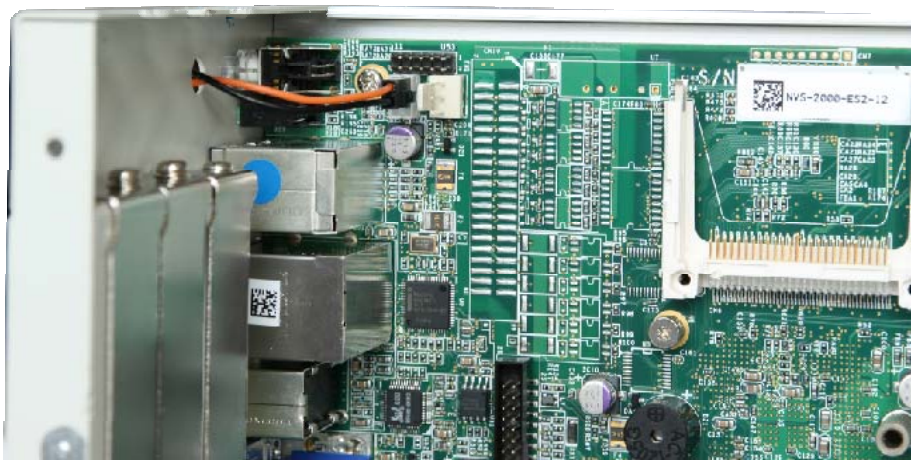
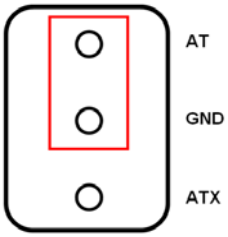


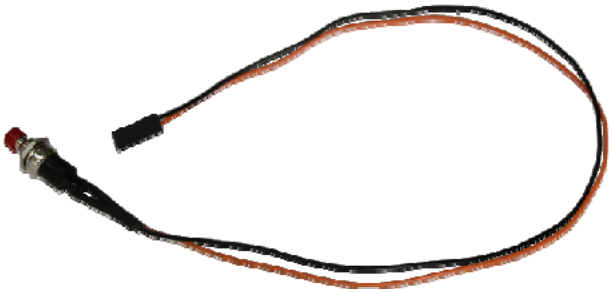


6. When the latched switch is closed, the DC power is break off and system is turn off. When the latched switch is opened, the DC power is feed-in, and, with the correct setting of "**Power On after Power Failure"** BIOS option, the system is turn on.

To power on Nuvo-2000 using an external non-latched switch (ATX-mode)

For an application which places Nuvo-2000 inside a cabinet, it's useful to control the on/off of the system using an external switch. Nuvo-2000 provides an on-board 3-pin wafer connector (for detail, please refer to section 2.3) for connecting a latched/non-latched switch and behaves either AT-mode or ATX-mode power on/off control.
When using the ATX-mode on/off control, you need a non-latch switch. The external non-latched switch acts exactly the same as the power button on the front panel. To power on Nuvo-2000 using an external non-latched switch (ATX-mode), please follow the steps listed below.

1. Prepare a non-latched switch with a 2-pin, 2.0mm pitch connector.



2. Connect the non-latched switch to the ATX pin and GND pin of the on-board wafer connector.

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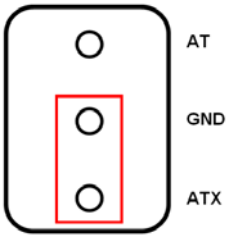

3. Push the non-latched switch and then system is on (the blue LED of power button on the front panel is on at the same time). Push the non-latched switch when system is on can turn off the system. If your operating system supports ATX power mode (i.e. Microsoft Windows or Linux), push the power button causes a pre-defined system behavior, such as shutdown or hibernation.

To power on Nuvo-2000 using Wake-on-LAN function

Wake-on-LAN (WOL) is a mechanism to wake up a computer system from a S3 (standby), S4 (Hibernate) or S5 (system off with standby power) state via issuing Subnet Directed Broadcasts (SDB) or a magic packet. Nuvo-2000 implements the Wake-on-LAN function for its GbE port. To enable WOL function and power on you Nuvo-2000, please follow the steps listed below.

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Enter the **[Power]** BIOS setting menu.
3. Configure the **[Wake On LAN]** BIOS option as **[Enabled]**. This setting enables the Wake-on-LAN function for Nuvo-2000. Please refer to section 4.1 for the instruction of configuring this option.
4. In Windows system, identify the Local Area Connection of Intel® 82574L Gigabit Controller and click the **Configure** button.

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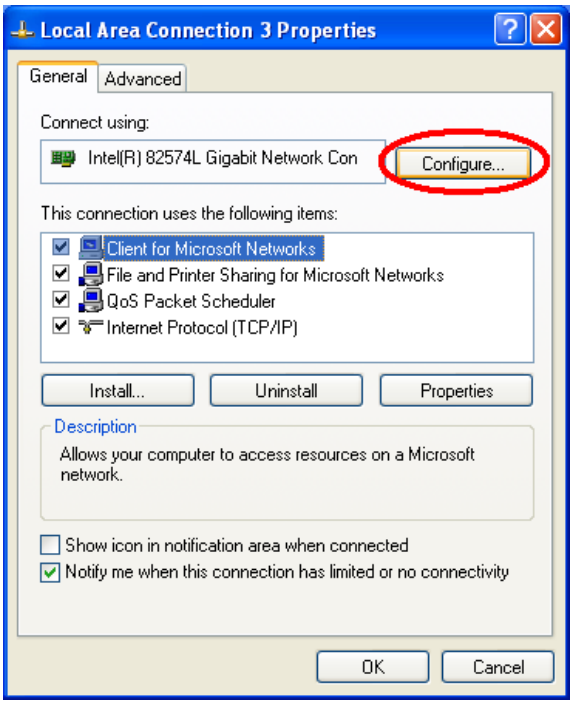
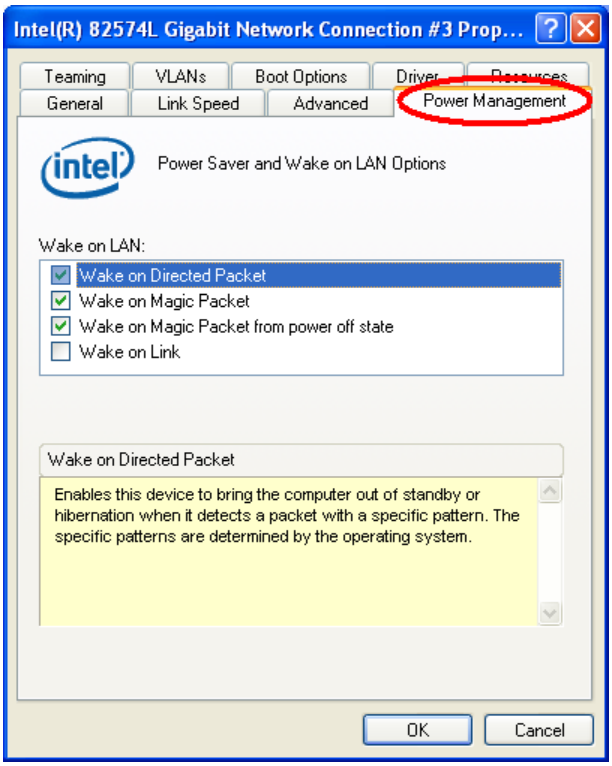


5. Click the Power Management tag, there are several options for Wake-on-LAN.


Intel(R) 82574L Gigabit Network Connection #3 Prop...
Teaming
VLANs
Boot Options
Driver
Resources
General
Link Speed
Advanced
Power Management
Power Saver and Wake on LAN Options
Wake on LAN:
Wake on Directed Packet
Wake on Magic Packet
Wake on Magic Packet from power off state
Wake on Link
Wake on Directed Packet
Enables this device to bring the computer out of standby or hibernation when it detects a packet with a specific pattern. The specific patterns are determined by the operating system.
OK
Cancel

- **Wake on Direct Packet**
  Nuvo-2000 can wake from S3 or S4 state when receiving a direct packet, such as a ping command from another computer. Please note that the "Wake on Direct Packet" option does not support waking from S5 state.
- **Wake on Magic Packet**
  Nuvo-2000 can wake from S3 or S4 state when receiving a magic packet. The magic packet is a broadcast frame containing anywhere within its payload 6 bytes

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of all 255 (FF FF FF FF FF FF in hexadecimal), followed by sixteen repetitions of the target computer's 48-bit MAC address.

For example, NIC's 48-bit MAC Address is 78h D0h 04h 0Ah 0Bh 0Ch

DESTINATION SOURCE MISC
FF FF FF FF FF FF
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
78 D0 04 0A 0B 0C 78 D0 04 0A 0B 0C
MISC CRC

There are some free tools available on Internet that can be used to send a magic packet. Please refer to the following link to understand more about Magic Packet.
http://en.wikipedia.org/wiki/Wake-on-LAN

- **Wake on Magic Packet from power off state**
  When checking this option, Nuvo-2000 can wake from S5 (system off with standby power) state when receiving a magic packet.

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Chapter 4 BIOS and Driver

4.1 BIOS Settings

Nuvo-2000 is shipped with factory-default BIOS settings cautiously programmed for best performance and compatibility. In this section, we'll illustrate some of BIOS settings you may need to modify. Please always make sure you understand the effect of change before you proceed with any modification.

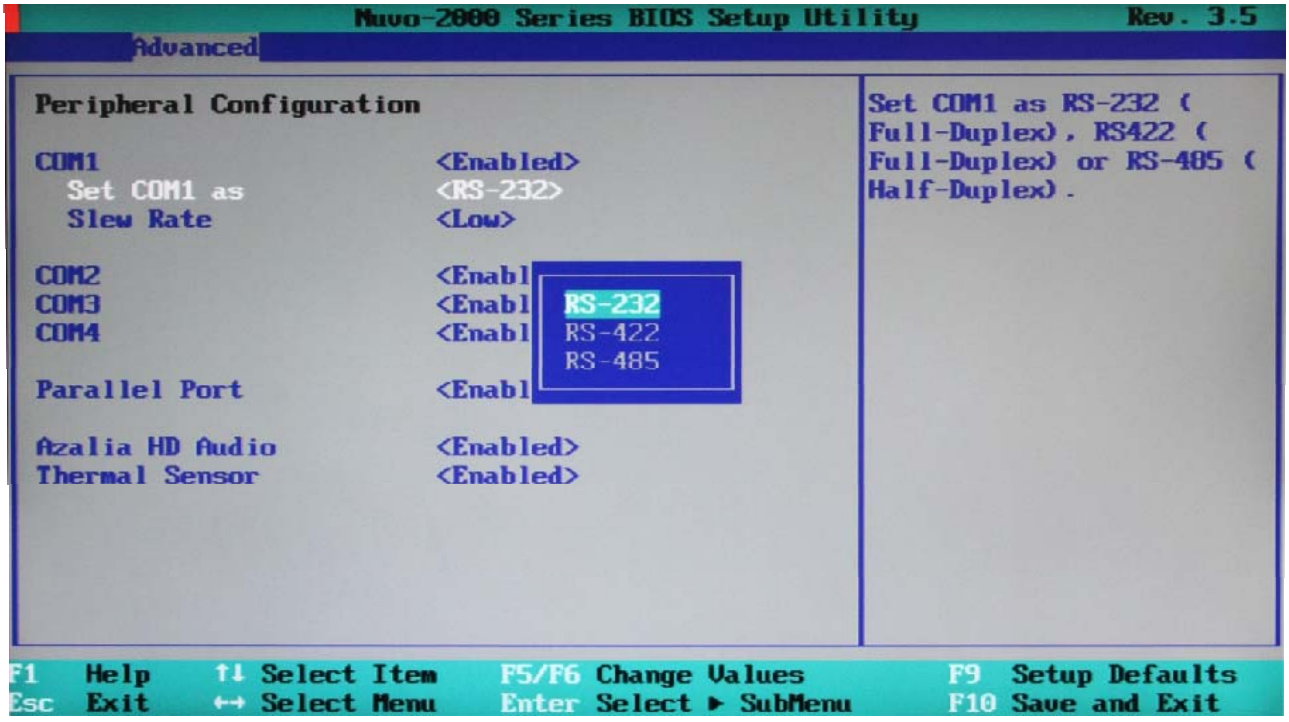
COM1 Operating Mode

COM1 of Nuvo-2000 supports RS-232 (full-duplex), RS-422 (full-duplex) and RS-485 (half-duplex) mode. You can set the COM1 operating mode via BIOS settings. Another option in BIOS called "Slew Rate" defines how sharp the rasing/falling edge is for the output signal of COM1. For long-distance RS-422/485 transmission, you may set the "Slew Rate" option as "High" to improve signal quality.

.

To set COM1 operating mode:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Peripheral Configuration]**.
3. Set the **[Set COM1 as]** to a proper mode for COM1 of your Nuvo-2000.



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SATA Controller Mode

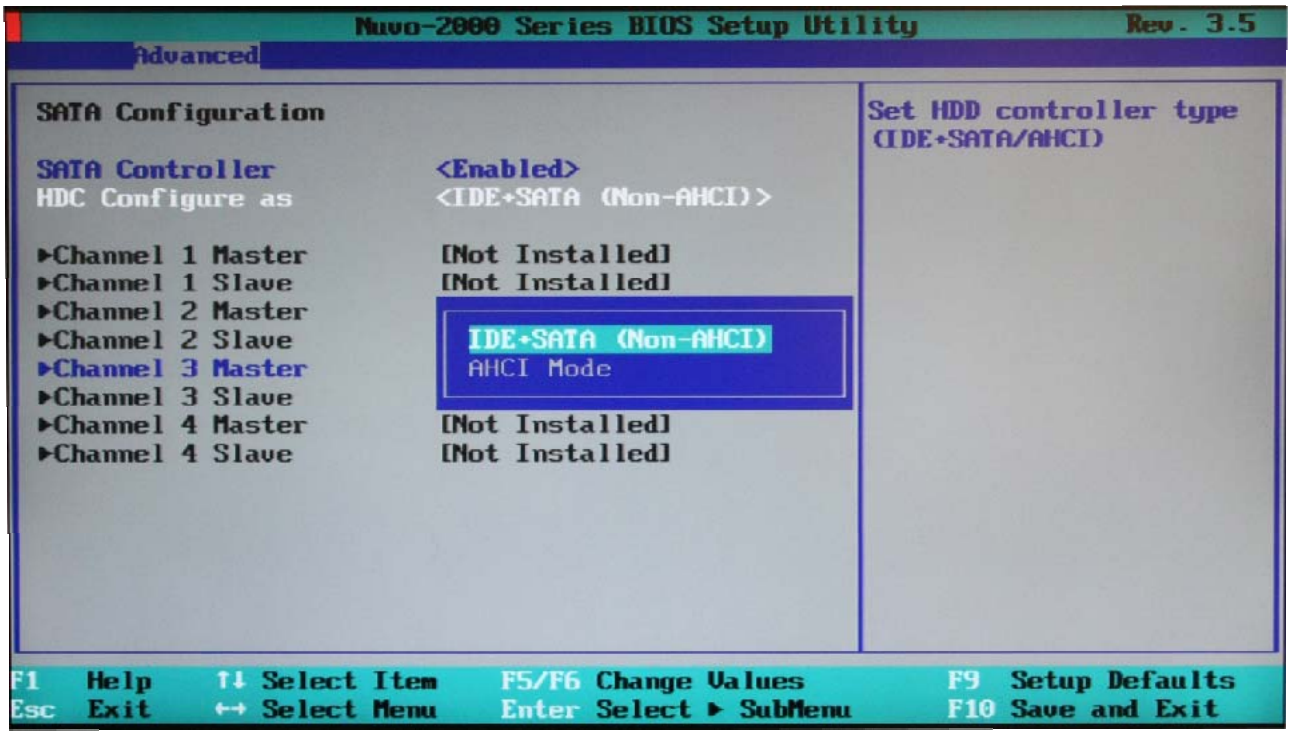
The SATA controller of Nuvo-2000 supports IDE (non-AHCI) and AHCI mode. IDE mode is a legacy interface and is compatible with most storage devices. AHCI mode, which exposes SATA's advanced capabilities such as hot swapping and native command queuing, are supported in several later version of operating systems.

Our suggestion of how to set SATA controller mode is

- If you're using Windows XP, Linux kernel earlier than 2.6.19, or you want to use a CF card, you should select IDE+SATA (Non-AHCI) mode.
- If you're using Windows Vista, Windows 7, or Linux kernel from 2.6.19 onward, you can select AHCI mode for better performance.

To set SATA controller mode:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[SATA Configuration]**.
3. Set the **[HDC Configure as]** to a proper mode for your Nuvo-2000.



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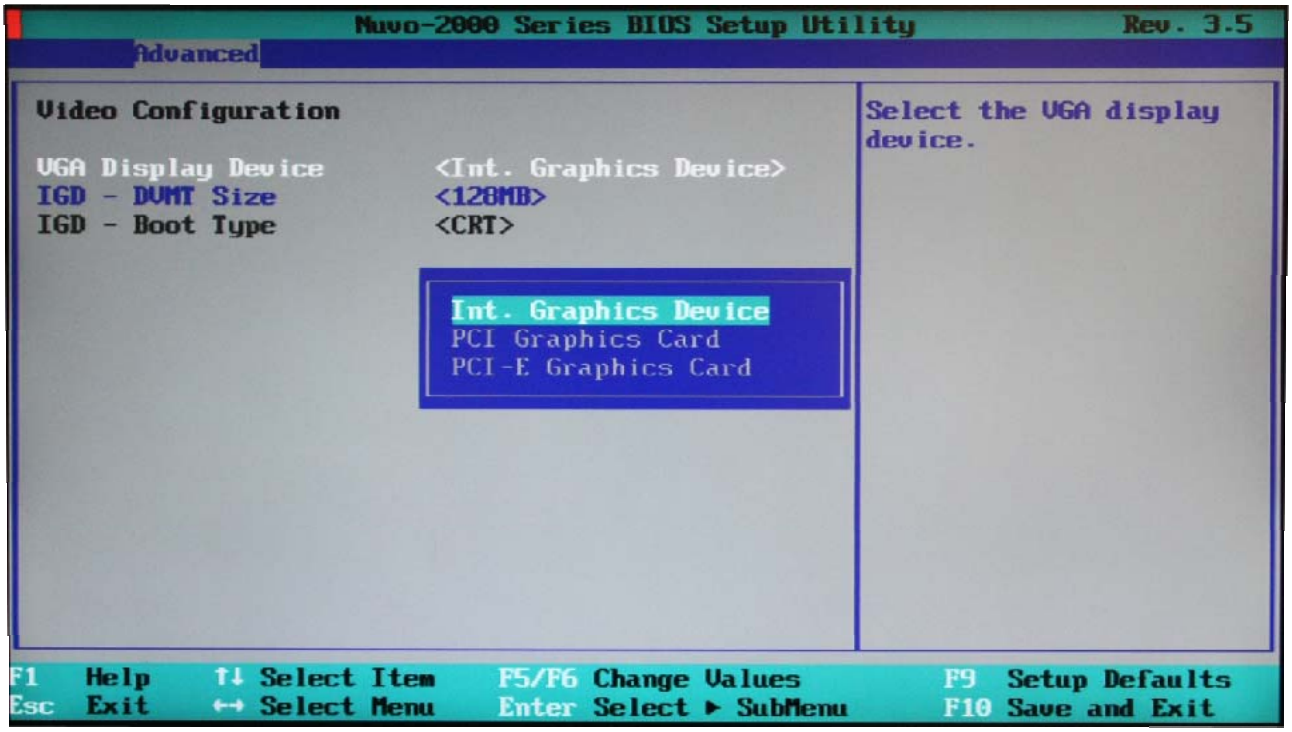
Boot Display Device

Nuvo-2000 has an Integrated Intel® GMA 3150 graphics engine in its Atom D525 processor. For some applications, you may need to install and use a stand-alone graphics card for display output. When using a PCI or PCI Express graphics card, you should set a proper boot display device in BIOS in advance.

To set the boot display device:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Video Configuration]**.
3. Set the **[Boot Display Device]** to a proper device for your Nuvo-2000.
   - Select "Int. Graphics Device" if using integrated Intel® GMA 3150 graphics engine
   - Select "PCI Graphics Card" if using a PCI graphics card
   - Select "PCI-E Graphics Card" if using a PCI Express graphics card



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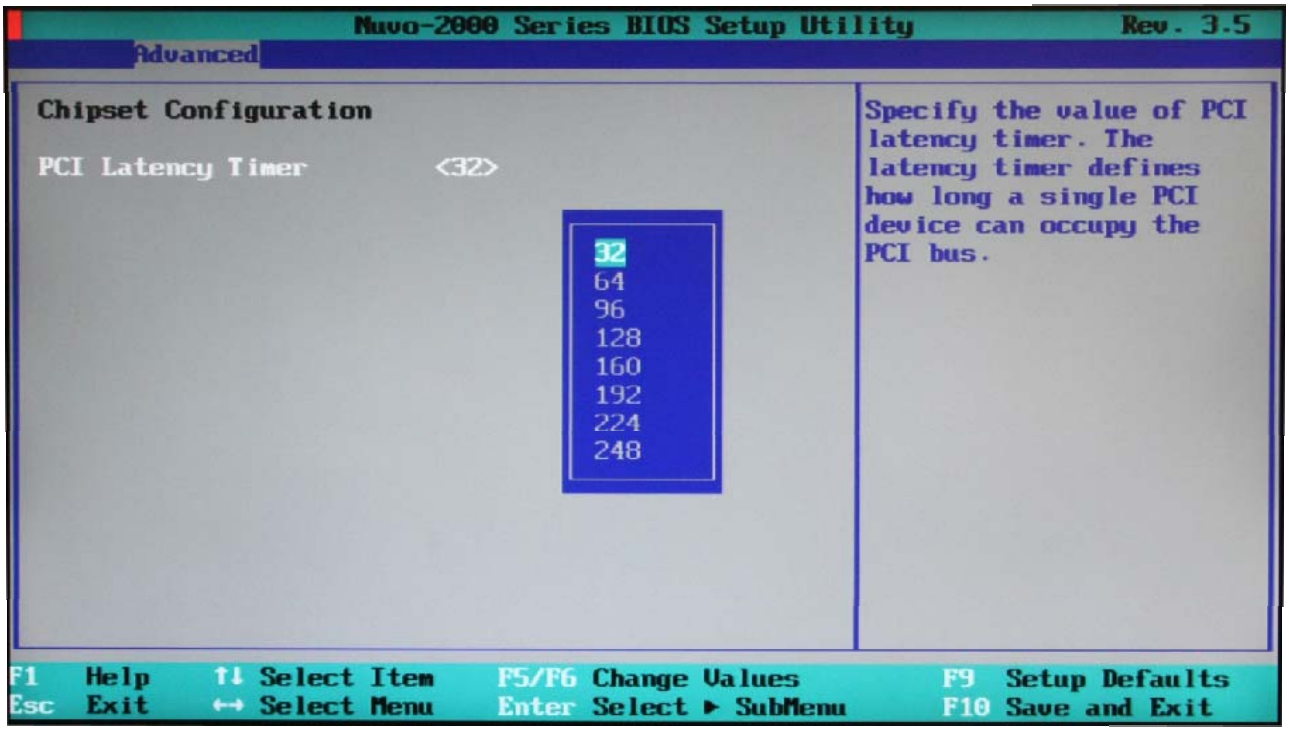
PCI Latency Timer

PCI latency timer determines how long a PCI device can occupy the PCI bus for data transfer. Setting a higher value of PCI latency timer will increase the data throughput of a single PCI device, but also increase the waiting time for other PCI devices. Our suggestion for specifying the value of PCI latency timer is:

- If the PCI devices installed are operating with low data throughput, you should specify a smaller value of PCI latency timer to decrease the waiting time for PCI devices.
- If there is a PCI device usually requests a "burst" data transfer (e.x. a Gigabit Ethernet card), a larger value of PCI latency timer is suggested.

To set the PCI latency timer:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]** → **[Chipset Configuration]**.
3. Set the **[PCI Latency Timer]** to a proper value for your Nuvo-2000.



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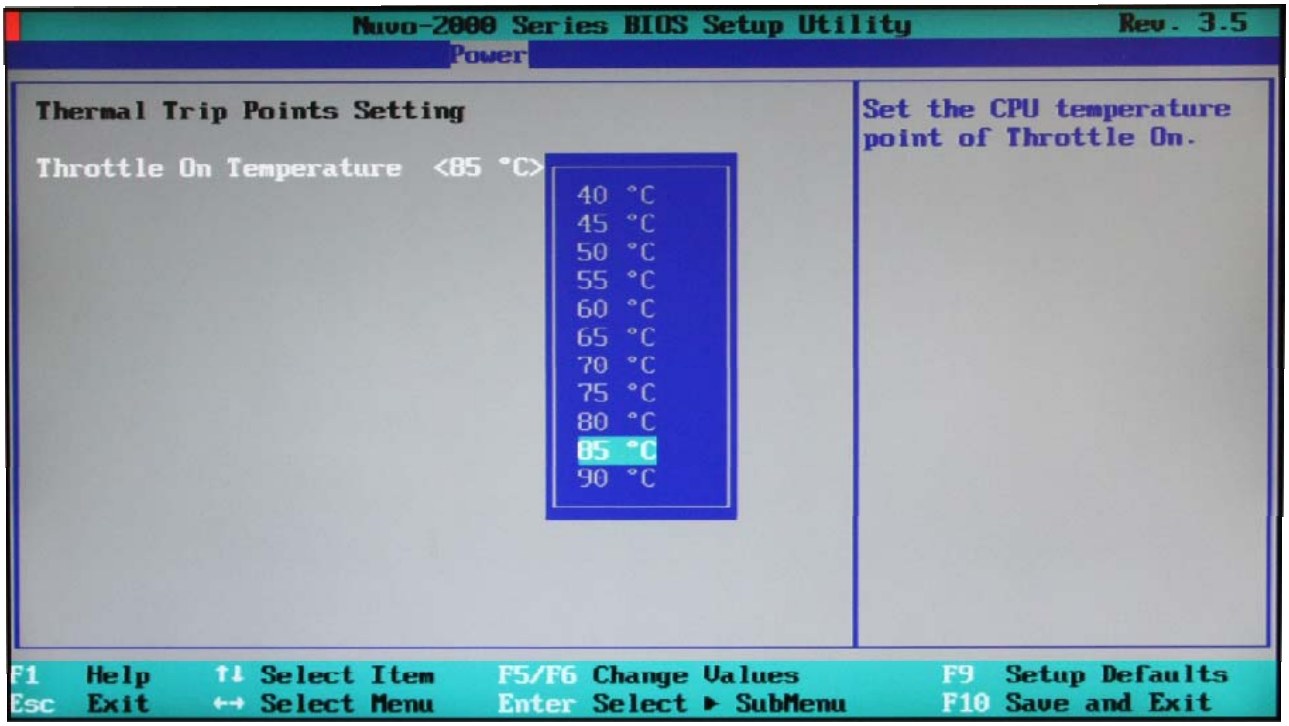
Trip Point for CPU Thermal Throttling

To avoid CPU from overheating in some circumstances, Intel® provides a measure called "thermal throttling" to protect CPU. When CPU core temperature reaches the throttling-on temperature, CPU start to insert idle clock cycles to reduce heat generated. Since Intel® Atom D525 processor has a Tj_{max} (core temperature limit) of 100°C, we suggest you set a value of 85°C as the throttling-on temperature.

To set CPU thermal throttling temperature:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]** → **[Advanced CPU Control]** → **[Thermal Trip Points Setting]**.
3. Set the **[Throttle On Temperature]** to a proper value for your Nuvo-2000.



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Power On after Power Failure Option

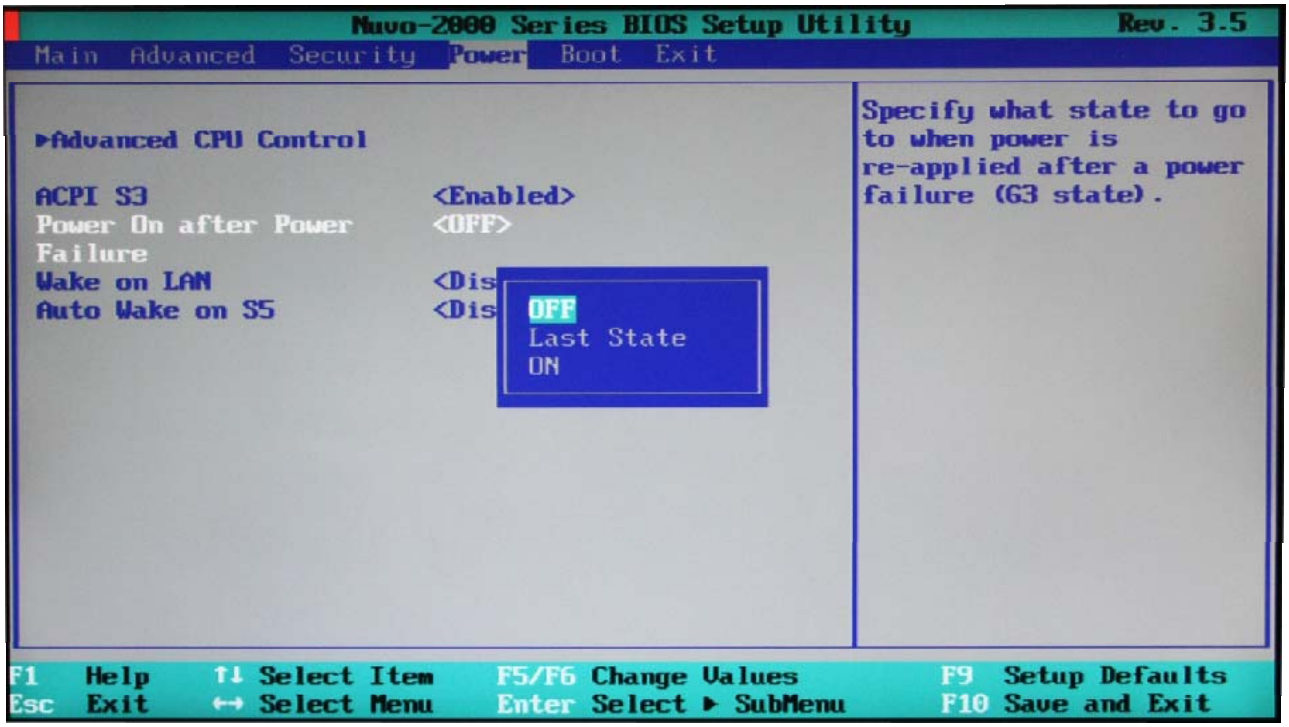
This option defines the behavior of Nuvo-2000 when DC power is supplied.

OFF	System is kept in off state when DC power is supplied.
Last State	The on/off state of the system is determined according to the last state when DC power is disconnected. For example, if system is still on but DC power is unplugged, the system is powered on next time when DC power is supplied.
ON	System is powered on when DC power is supplied.

When you want to use the AT-mode remote on/off control function, you have to set this option to "ON". Please refer to section 3.8 for instructions of using AT-mode remote on/off control function.

To set "Power On after Power Failure" option:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Advanced]**.
3. Set the **[Power On after Power Failure]** to a proper value for your Nuvo-2000.


Nuvo-2000 Series BIOS Setup Utility
Rev. 3.5
Main Advanced Security Power Boot Exit
▸Advanced CPU Control
ACPI S3 <Enabled>
Power On after Power Failure <OFF>
Wake on LAN <Dis
Auto Wake on S5 <Dis
OFF
Last State
ON
Specify what state to go to when power is re-applied after a power failure (G3 state).
F1 Help ↑↓ Select Item F5/F6 Change Values F9 Setup Defaults
Esc Exit ↔ Select Menu Enter Select ▸ SubMenu F10 Save and Exit

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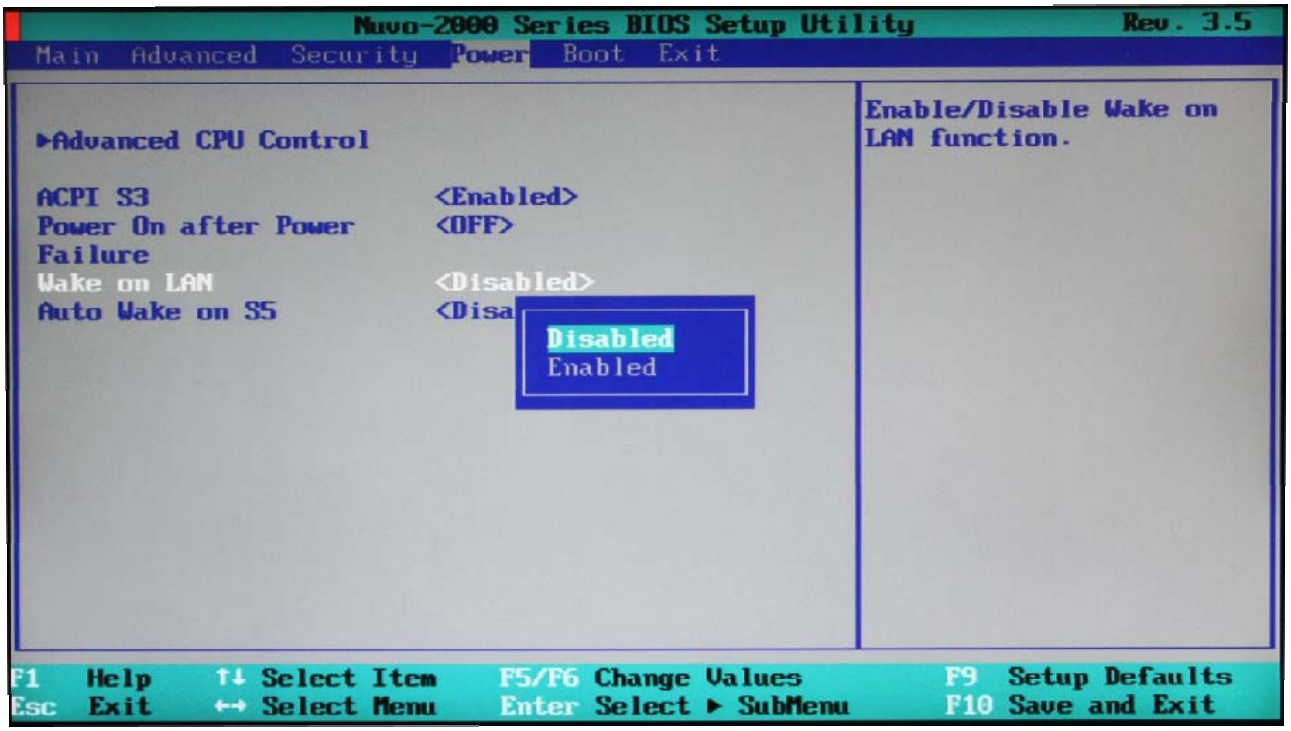
Wake-on-LAN Option

Wake-on-LAN (WOL) is a mechanism which allows you to turn on your Nuvo-2000 via Ethernet connection. To utilize Wake-on-LAN function, you have to enable this option first in BIOS settings. Please refer to section 3.8 for instructions of using WOL function.

To enable/disable "Wake on LAN" option:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Power]**.
3. Enable/disable the **[Wake on LAN]** option according to your application.


Nuvo-2000 Series BIOS Setup Utility
Rev. 3.5
Main Advanced Security Power Boot Exit
▶Advanced CPU Control
ACPI S3 <Enabled>
Power On after Power Failure <OFF>
Wake on LAN <Disabled>
Auto Wake on S5 <Disa
Disabled
Enabled
Enable/Disable Wake on LAN function.
F1 Help ↑↓ Select Item F5/F6 Change Values F9 Setup Defaults
Esc Exit ↔ Select Menu Enter Select ▶ SubMenu F10 Save and Exit

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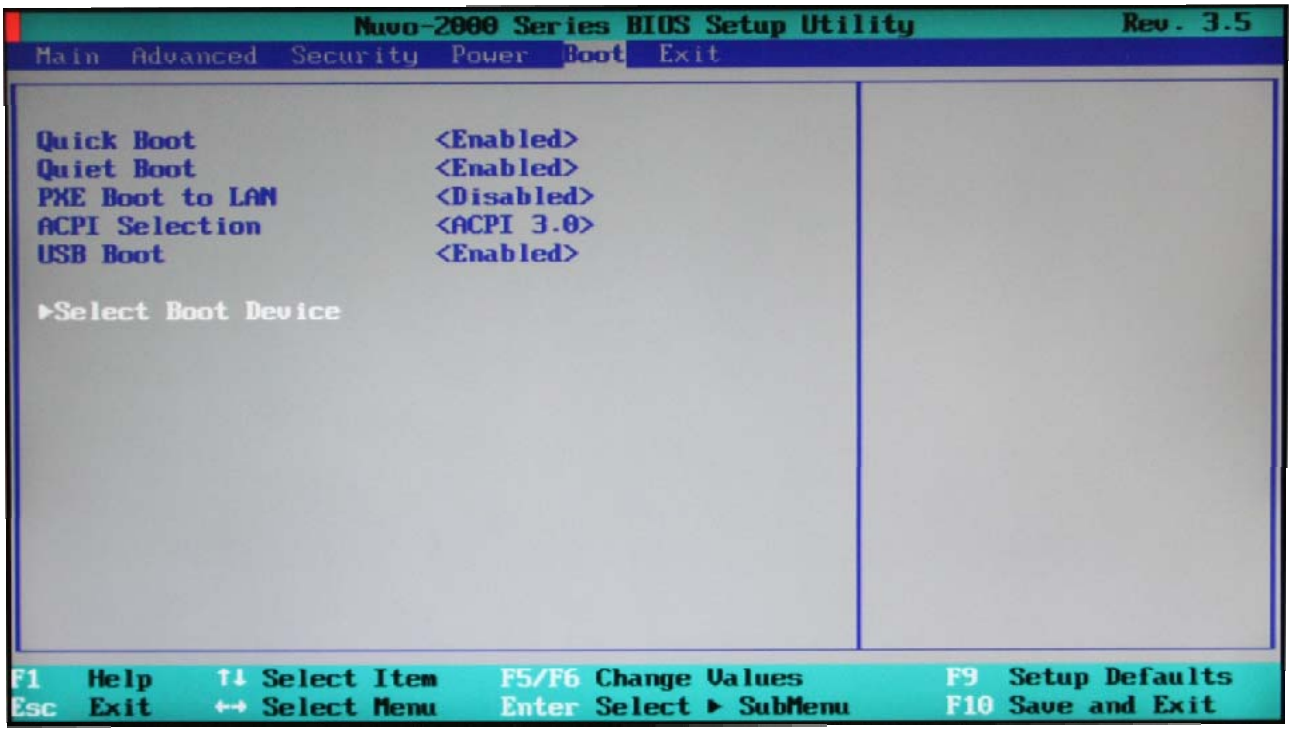
Select a Boot Device

When you have multiple bootable devices connected to your Nuvo-2000 (i.e. HDD, USB flash disk, USB DVD-drive), you may need to select one of them as the boot device. There are two ways to select the device. You can either, press F12 when system boots up to go to Boot Manager and then select one of the devices, or select the boot device in BIOS settings.

To select a boot device in BIOS:

1. When Nuvo-2000 boots up, press F2 to enter BIOS setup utility.
2. Go to **[Boot]** → **[Select Boot Device]**.
3. It appears a list which contains all bootable devices connected to your Nuvo-2000. You can use F5/F6 or +/- to change the boot order.



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4.2 Operating System Support

Nuvo-2000 supports most operating system developed for Intel® x86 architecture. The following list contains the operating systems which have been tested in Neousys Technology Inc.

- Microsoft Window XP 32-bit
- Microsoft Window 7 32-bit
- Microsoft Window 7 64-bit
- Ubuntu 11.04 Desktop 64bit
- Ubuntu 10.10 Desktop 32bit
- Debian 6.0 64bit

Neousys will keep this list updated as we continuously test other operating systems with Nuvo-2000. Please contact us for the latest OS support list.

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4.3 Driver Installation

Neousys Technology Inc. provides a very convenient utility in "Drivers & Utilities DVD" to allow the "One-Click" driver installation. This utility automatically detects your Windows operating system and installs all necessary drivers to your Nuvo-2000 with just one mouse click.

To install all drivers using "One-Click" driver installation

1. Insert the "Drivers & Utilities DVD" into a USB DVD-drive attached to your Nuvo-2000. A setup utility launches and the following dialog appears.

2. Click on the **"Automatic Driver Installation"**. The setup utility will automatically detect your Windows operating system and install all necessary drivers. According to different versions of Windows, the installation process takes about 6~8 minutes. Once driver installation is done, the setup utility reboots your Windows and your system works normally afterward.

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To install drivers manually

You can also manually install each driver for Nuvo-2000. Please refer to the following information about installing drivers for different operating system.

Windows XP SP3

Drivers for Windows XP are located in **x:\Drivers\Nuvo-2000\XP**, which x: stands for your DVD drive. The recommended driver installation sequence is

1. Chipset driver (x:\Drivers\Nuvo-2000\XP\Chipset\infinst_autol.exe)
2. Graphics driver (x:\Drivers\Nuvo-2000\XP\Graphics\Setup.exe)
3. Audio driver (x:\Drivers\Nuvo-2000\XP\Audio\Setup.exe)
4. LAN driver (x:\Drivers\Nuvo-2000\XP\LAN\APPS\PROSETDX\Win32\DxSetup.exe)

Windows XP SP2

Drivers for Windows XP are located in **x:\Drivers\Nuvo-2000\XP**, which x: stands for your DVD drive. The recommended driver installation sequence is

1. Chipset driver (x:\Drivers\Nuvo-2000\XP\Chipset\infinst_autol.exe)
2. Audio patch for HD audio (x:\Drivers\Nuvo-2000\XP\Audio\MSHDQFE\Win2K_XP\us\kb888111xpsp2.exe)
3. Graphics driver (x:\Drivers\Nuvo-2000\XP\Graphics\Setup.exe)
4. Audio driver (x:\Drivers\Nuvo-2000\XP\Audio\Setup.exe)
5. LAN driver (x:\Drivers\Nuvo-2000\XP\LAN\APPS\PROSETDX\Win32\DxSetup.exe)

Windows 7 or Windows Vista 32-bit

Drivers for Windows 7 or Vista 32-bit are located in **x:\Drivers\Nuvo-2000\Win7_32**, which x: stands for your DVD drive. The recommended driver installation sequence is

1. Chipset driver (x:\Drivers\Nuvo-2000\Win7_32\Chipset\infinst_autol.exe)
2. Graphics driver (x:\Drivers\Nuvo-2000\ Win7_32\Graphics\Setup.exe)
3. Audio driver (x:\Drivers\Nuvo-2000\ Win7_32\Audio\Setup.exe)
4. LAN driver (x:\Drivers\Nuvo-2000\ Win7_32\LAN\APPS\PROSETDX\Win32\DxSetup.exe)

Windows 7 or Windows Vista 64-bit

Drivers for Windows 7 or Vista 64-bit are located in **x:\Drivers\Nuvo-2000\Win7_64**, which x: stands for your DVD drive. The recommended driver installation sequence is

1. Chipset driver (x:\Drivers\Nuvo-2000\Win7_64\Chipset\infinst_autol.exe)

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2. Graphics driver (x:\Drivers\Nuvo-2000\ Win7_64\Graphics\Setup.exe)
3. Audio driver (x:\Drivers\Nuvo-2000\ Win7_64\Audio\Setup.exe)
4. LAN driver (x:\Drivers\Nuvo-2000\ Win7_64\LAN\APPS\PROSETDX\Winx64\DxSetup.exe)

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Appendix A Using H/W Watchdog Timer

Watchdog timer (WDT) is a hardware mechanism to secure the normal operation of a system. When watchdog timer is set, user's program must periodically reset the timer in prior to watchdog timer is expired. This function allows users to reset the system in case of system or application halts.
On Nuvo-2000, watchdog timer function is implemented using ITE8783 Super I/O chip. We provide an easy-to-use function library to program and utilize the watchdog function. In this chapter, we illustrate how to use the WDT function.

A.1 Before Programming WDT

The WDT_DIO function library is delivered in the form of several individual files. Before you start to program WDT function on Nuvo-2000, you should copy these files to the correct directory.

1. Copy **winio32.dll**, **winio32.sys** and **WDT_DIO32.dll** to C:\Windows\system32\ (if your system drive is not c:, use the exact system drive instead)
2. Copy **WDT_DIO.h** and **WDT_DIO32.lib** to your project workspace.
3. Add **WDT_DIO32.lib** as a linking library of your project.

For non-administrator users who want to use the WDT and DIO library, please login in as Administrator first and invoke **RegisterWinIOService()**. This function writes a Registry item to launch a service for winio driver. After booting the Windows system, a non-administrator user can use the WDT and DIO library.

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A.2 Function Reference

InitWDT

Description

Initialize the WDT function. You should always invoke InitWDT() before set or start watch-dog timer.

Parameter

None

Return Value

Always returns TRUE

Usage

```
BOOL    bRet = InitWDT()
```

SetWDT

Description

Set timeout value and unit for watch-dog timer. When InitWDT() is invoked, a default timeout value of 255 seconds is assigned.

Parameter

tick

WORD value (1 ~ 65535) to indicate timeout ticks.

unit

BYTE value (0 or 1) to indicate unit of timeout ticks.

0 : unit is minute

1: unit is second

Return Value

If value of unit is correct (0 or 1), this function returns TRUE, otherwise FALSE.

Usage

```
WORD    tick=255;
BYTE    unit=1; //unit is second.

BOOL    bRet = SetWDT(tick, unit); //timeout value is 255 seconds
```

StartWDT

Description

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Start countdown of WDT. When WDT is started, the WDT LED indicator starts to blink in a frequency of 1Hz. If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

If the timeout value is given in correct format, this function returns TRUE, otherwise FALSE.

Usage

BOOL bRet = StartWDT()

ResetWDT

Description

Reset the timeout value to the value given by SetWDT(). If no ResetWDT() or StopWDT is invoked before WDT is counted to 0, the WDT expires and system resets.

Parameter

None

Return Value

Always returns TRUE;

Usage

BOOL bRet = ResetWDT()

StopWDT

Description

Stop the countdown of WDT. When WDT is stopped, the WDT LED indicator stops blinking.

Parameter

None

Return Value

Always returns TRUE;

Usage

BOOL bRet = StopWDT()

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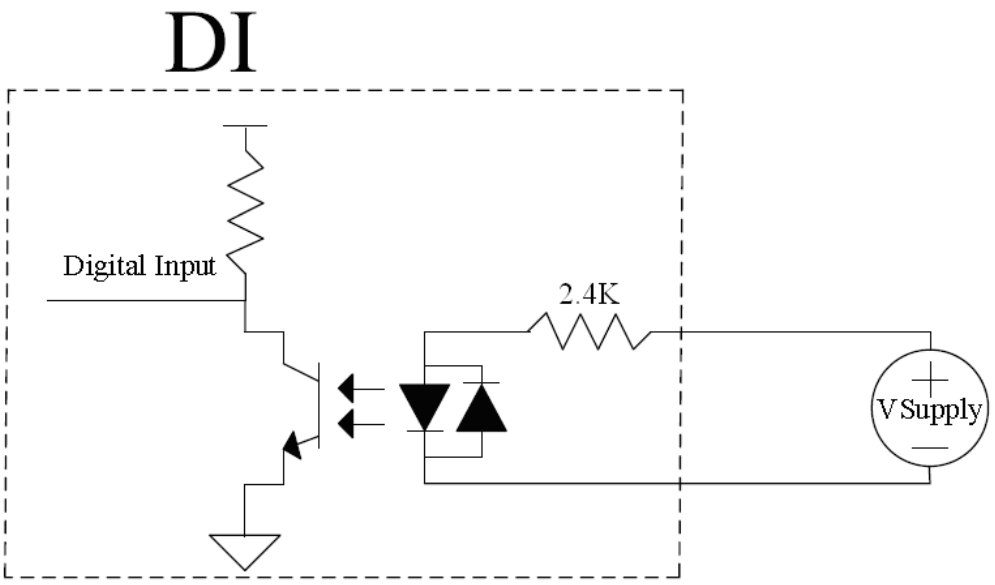
Appendix B Using Isolated DIO

Nuvo-2000 provides the optional isolated digital DIO for industrial control usage. In this chapter, we illustrate how to connect cables to isolated DIO channels and the function reference.

B.1 Wiring for Isolated DIO

The digital input function of Nuvo-2000 is implemented using a photo-coupler with an internally series-connected 2.4 kΩ resistor. You need to provide a voltage to specify the logic high/low state. The input voltage for logic high is 5~24V, and the input voltage for logic low is 0~1.5V.



The digital output function of Nuvo-2000 is implemented using Power MOSFET + Analog Device iCoupler® component. The DO channels are configured as NO (normally-open) configuration. When you turn on Nuvo-2000, all DO channels have a deterministic state of logic 0 (circuit disconnected from GND return). When logic 1 is specified, MOSFET is activated and GND return path is established. You can use either sinking current connection or sourcing current connection for DO of Nuvo-2000. The following diagrams are the suggested wiring for DO:

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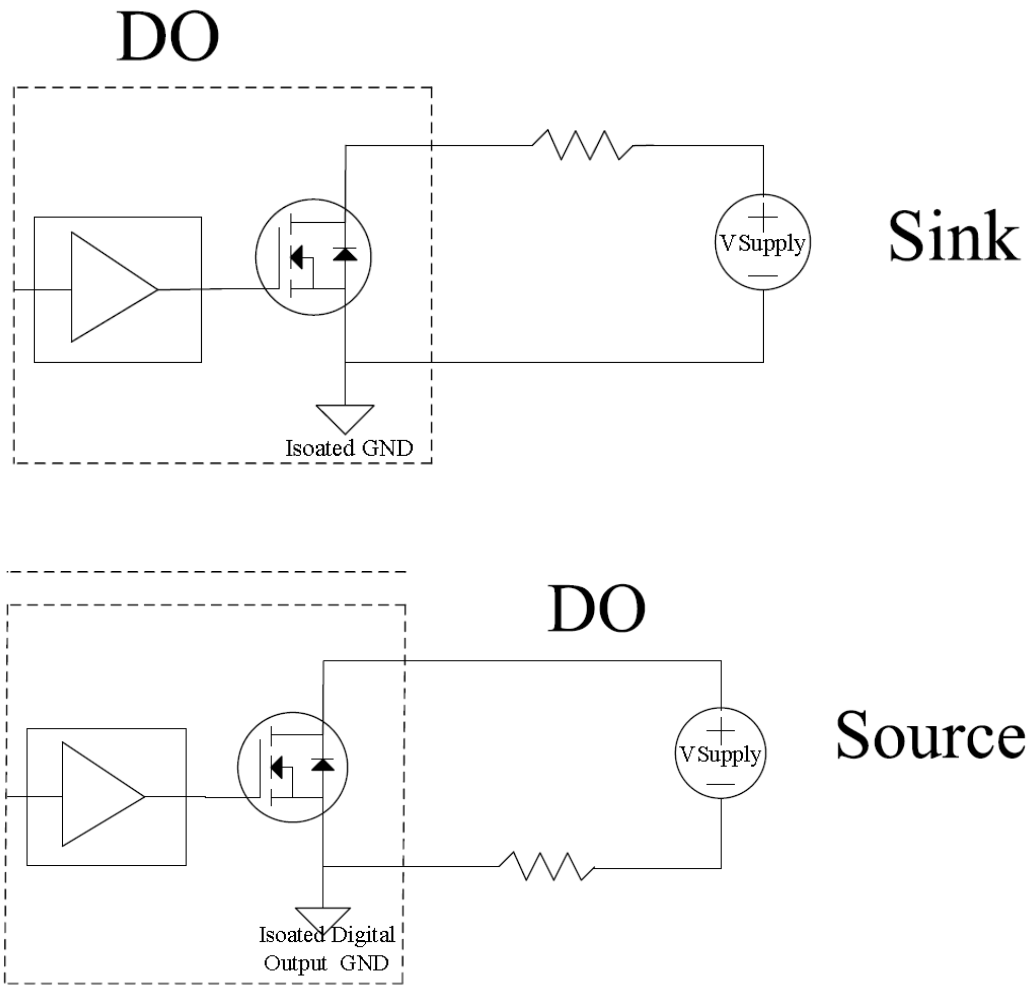

B.2 Before Programming DIO

The WDT_DIO function library is delivered in the form of several individual files. Before you start to program isolated DIO function on Nuvo-2000, you should copy these files to the correct directory.

1. Copy **winio32.dll**, **winio32.sys** and **WDT_DIO32.dll** to C:\Windows\system32\ (if your system drive is not c:, use the exact system drive instead)
2. Copy **WDT_DIO.h** and **WDT_DIO32.lib** to your project workspace.
3. Add **WDT_DIO32.lib** as a linking library of your project.

For non-administrator users who want to use the WDT and DIO library, please login in as Administrator first and invoke **RegisterWinIOService()**. This function writes a Registry item to launch a service for winio driver. After booting the Windows system, a non-administrator user can use the WDT and DIO library.

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B.3 Function Reference

InitDIO

Description

Initialize the DIO function. You should always invoke InitDIO() before write/read any DIO port/channel.

Parameter

None

Return Value

Always returns TRUE

Usage

```
BOOL    bRet = InitWDT()
```

DIReadLine

Description

Read a single channel of isolated digital input.

Parameter

ch

BYTE value to indicate the DI channel to be read. For Nuvo-2000, *ch* should be a value of 0 ~ 11.

Return Value

The status (TRUE or FALSE) of the specified DI channel.

Usage

```
BYTE    ch=3; //DI channel #3

BOOL    DIChValue = DIReadLine(ch); //read DI channel #3
```

DIReadPort

Description

Read the entire isolated digital input port (12 channels).

Parameter

None

Return Value

A WORD value indicates the status of DI port (Lower 12 bits of this WORD value are

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the status of 12 DI channels).

Usage

WORD DIPortValue = DIReadPort ();

DOWriteLine

Description

Write a single channel of isolated digital output.

Parameter

ch

BYTE value to indicate the DO channel to be written. For Nuvo-2000, *ch* should be a value of 0 ~ 11.

value

BOOL value (TRUE or FALSE) to specify the status of DO channel.

Return Value

None

Usage

```
BYTE    ch=3; //DI channel #3
BOOL    DOChValue=TRUE;

DOWriteLine(ch, DOChValue); //write DO channel #3 as TRUE
```

DOWritePort

Description

Write the entire isolated digital output port (12 channels).

Parameter

value

WORD value to specify the status of the DO port (Lower 12 bits represent the corresponding DO channel). For Nuvo-2000, *value* should be a value of 0~4095 (0x0000 ~ 0x0FFF).

Return Value

None

Usage

```
WORD   DOPortValue=0x0FFF; //111111111111b

DOWritePort(DOPortValue); //write DO port as 111111111111b
```

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